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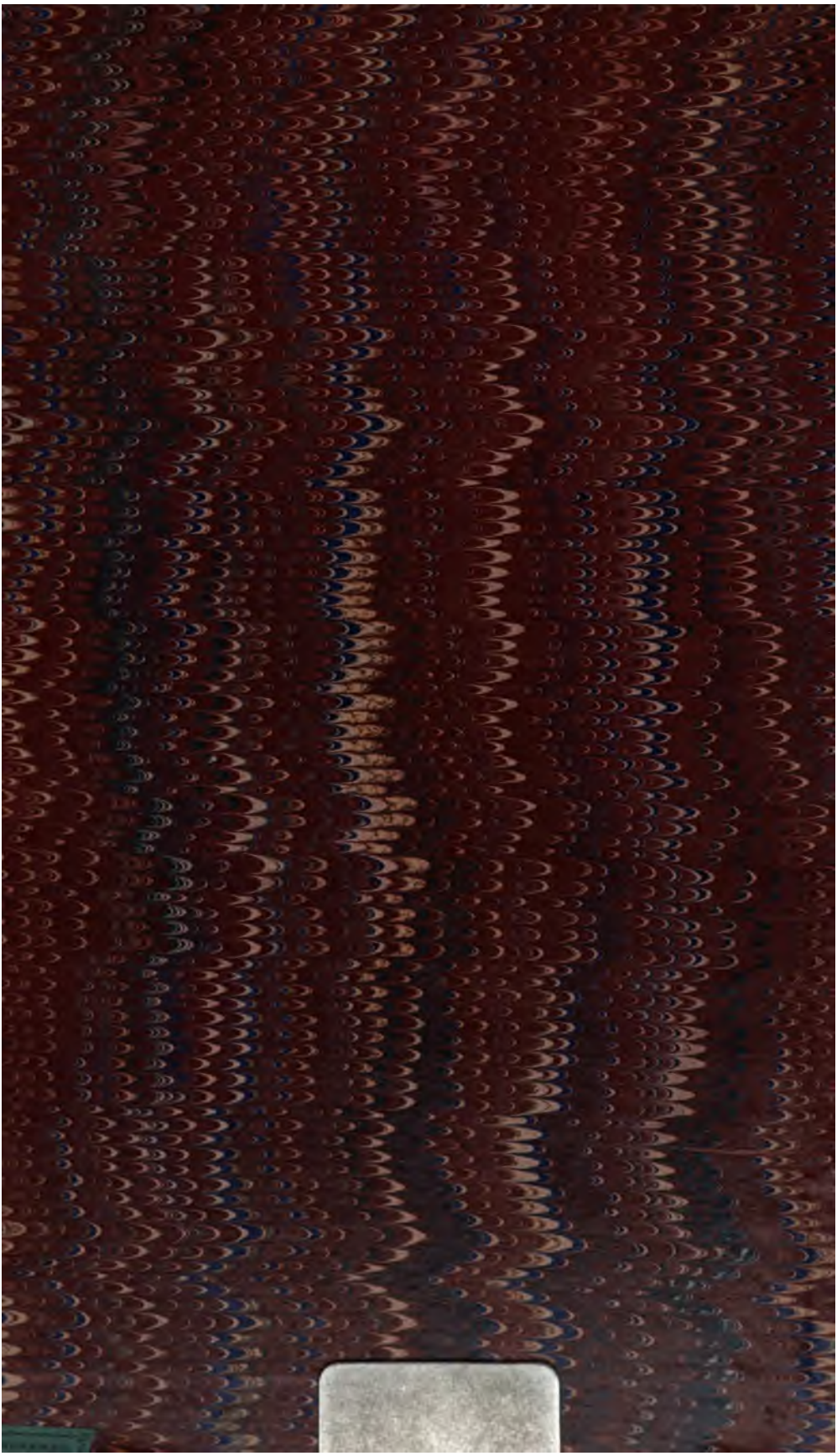

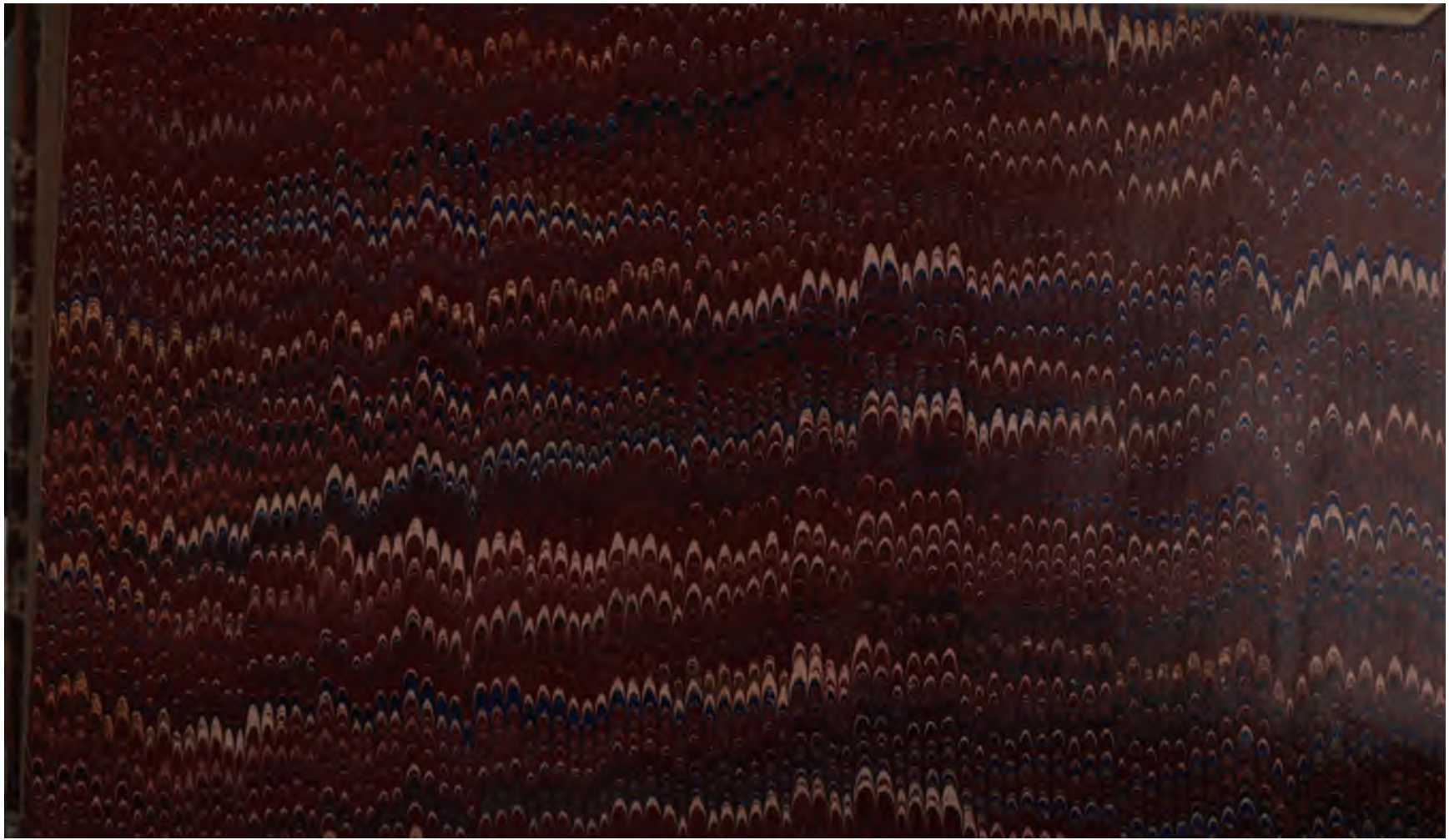

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TRANSACTIONS

OF THE

AMERICAN ENTOMOLOGICAL SOCIETY.

VOLUME VI.

Catalogue of the DIURNAL LEPIDOPTERA of America North of Mexico.

BY WILLIAM H. EDWARDS.

Since the publication of the Synopsis which completed the first volume of the "Butterflies of North America," in 1872, a large number of new species have been described, belonging to the North American fauna, while the position of many given in the Synopsis has been determined by bringing together the types from several collections. Many also were included on various information, now regarded as erroneous. And much has been learned, in the last few years, of the phenomena of dimorphism, whereby two or more forms which had been regarded as distinct species have resolved into one.

For these reasons, if no other, a new catalogue of species of the Diurnals is required. And indeed, for many and good reasons, new and reformed catalogues of every class of the Lepidoptera of North America are required, and it is intended that this shall be the first of a complete series.

In the preparation of the present one I have received large assistance from Mr. Lintner and Mr. Henry Edwards, and, in general, the plan herein adopted, and the changes from the Synopsis, both as to the genera and species, have met their approval. I have also availed myself somewhat of Mr. Scudder's recent Revisions and Lists, so far as regards the species, though differing widely from him as to the genera and nomenclature.

It will be found that something over twenty species formerly accredited to the fauna have been dropped, and this has been done for want of authentication, no modern collector, so far as I have been able to learn, having taken any of these species within our territory. Several of them, all sub-tropical, were included in the Synopsis from verbal information received by me when I first began to collect butter-

flies. Others were found in Weidemeyer's Catalogue, 1864, and in works of various authors. Any such species which has not been taken within the United States the last twenty years, during which the whole country has been searched by eager collectors, may be set down as a very rare visitor, and good evidence is needed to prove that it was ever found here. A list of such species will, however, be given, for the satisfaction of any person who prefers to consider them as entitled to recognition.

For the same reason, I omit all of Mr. Reakirt's Southern Californian species which have not been seen by collectors since he gave them a habitat. These were obtained from Mr. Lorquin, the younger, who notoriously mixed his Mexican with Californian and even European insects, unlabelled, whence Mr. Reakirt was led into several admitted errors.

It has not been considered necessary to encumber these pages with references to works that are inaccessible to most of the lepidopterists and collectors of the country, and therefore I have given from such works merely enough to accredit the species; but have quoted fully from American authors, or others who have treated especially of American butterflies. Students who desire farther and fuller information can readily find it in Kirby's Catalogue, a most valuable and surprisingly accurate work in its references, and which no one who cares to know of the literature of the science should be without. I have also made references to authors who have treated of the preparatory stages, no matter how briefly, or of the habits of either larva or imago, and have indicated this class of information by a special sign.

In the general arrangement, while adopting the families and subfamilies of some of the later systematists, I adhere mainly to the order of Doubleday and his associates in the "Genera of Diurnal Lepidoptera." I have not seen reasons to induce me to follow these systematists spoken of in their radical changes, whereby the Papilionidæ are degraded, founded as they avowedly are on partial characters drawn from the imago, and almost regardless of the preparatory stages.

A great many systems of arrangement have had their rise and fall within the last half century based on one character or other of the imago, and it is safe to say that none will be other than temporary which does not regard the egg, and larva and chrysalis, as well as the butterfly. And it will be a very long time before the knowledge of the Lepidoptera is so complete as to permit of any permanent arrangement.

Certainly I do not believe the Papilionidæ to be the nearest allies

of the Hesperidæ, and through them of the Heterocera, and can confidently assert that, in the preparatory stages, these two families are as unlike as any of the series. And as to the butterflies themselves they stand at the two poles. Even Mr. Bates says of the Papilionidæ, they are "quite unconnected with the Hesperidæ, no connecting links between the two families being known." (Jl. of Entom. 1861, Dec.) In the imago, some Danainæ and Heliconinæ closely resemble species of Papilioninæ and of Pierinæ, and in any arrangement these four sub-families should stand near each other. But the fact of atrophied fore legs in Danais should no more give it precedence over Papilio than does such atrophy in other orders of insects give pre-eminence to the species subject to this phenomenon, or to the genera and families which contain them.

I do not believe that one family of the Diurnals has necessarily been evolved from another, and all from the Heterocera, by successive stages, in a direct line, as is implied in the arrangement I object to, but rather that, if such development may have sometimes taken place, in other cases families have radiated from a common progenitor, just as a group of species has done. And here and there resemblances between such families must be expected to occur, just as they do occur between the species, in both cases merely because they had a common origin.

The proposition is enunciated by Mr. Darwin, that "distinct species present analogous variations, and a variety of one species often assumes some of the characters of an allied species, or reverts to some of the characters of an early progenitor." And what is true of species is just as true of genera and families.

Moreover there may be affinities which are so only in appearance, arrived at through "biological necessity," as where the larvæ of Parnassius protects its chrysalis by a sort of coccoon, after the fashion of certain of the Heterocera, a fact much insisted on by the advocates of the modern arrangement. Now that habit may well have been found useful in this genus, considering the exposure to which the species are subject, dwelling on lofty mountains, treeless, often shrubless, and storm-swept. A naked and suspended chrysalis would stand a poor chance of surviving in such a region, and it is well known that the Parnassians alone of the Papilioninæ have been able to gain and maintain a foothold in elevated districts. That they have done it is owing to the necessary modification of the habits of the larvæ, and it is a singular notion that success in such respect should work the degradation of themselves and all their blood relations.

I have followed the recommendation of the Committee of the British Association of 1842, by giving the terminations of family and subfamily names in *idæ* and *inæ*, a practice very generally adopted since that day and both simple and convenient.

And I have aimed at presenting the genera, at least as far as Hesperidæ, as nearly as possible as they existed thirty years ago, when Doubleday's great work was published, in which each genus was carefully and elaborately defined. This was before the tendency towards incorporating the whole of Hübner's bekannter Schmetterlinge into the nomenclature began to prevail, or creating genera by wholesale by mere indication of types, without definition, or encroaching on the rights of species by creating so-called genera on infinitesimal differences.

The Rules adopted at Buffalo have in great degree delivered us from these evils. If genera are founded in nature, then nature should be followed, and a compact group like Parnassius, Colias, Callidryas, Argynnis, should receive a genus name. And if subdivisions be desirable for the sake of convenience, in the genera which have numerous species, they should be divided into sections. Such sections whether natural or artificial are not genera. Nevertheless it has been the fashion of late to split up a genus into numerous, co-equal, so-called genera, with no clue in their several names to their relationship. If genera are artificial creations, made for convenience, it must be in the last degree improper that they should be multiplied so as to overwhelm the science, and bury it out of sight. I follow the example of Doubleday and Boisduval in this matter.

And as a first step in the much needed reform, I strike out the name of Hübner wherever it is appended to a genus, neither believing Hübner's coitus to be genera, nor even could they be so held, that they received from Hübner satisfactory definition. Doubleday introduced a few of these coitus names for his own genera, and out of courtesy attached the letters "Hüb." to them. His example has finally led to the wholesale displacement of his own name and the names of his associates, and of the many distinguished lepidopterists of the last two generations, by the accrediting a large proportion of the existing genera to Hübner. I have shown elsewhere (Can. Ent. vol. 8), the injustice of these proceedings, and I refuse to be a party to them. In every case, the genus in this Catalogue is, or is intended to be, credited to the author who first proposed and described it, and courtesy gives place to justice.

It remains to speak of the arrangement of the Hesperidæ. Mr.

Scudder, several years ago, furnished me the names he adopted in his revision of this family,—the only family, by the way, connected with our fauna, which needed revision,—sending them from Europe, and I received his list barely in time to include it in the closing pages of the Synopsis and my volume, with no interval for examination or explanation. To this day it stands a bare list of names, without authority, the groups indicated never having received definition. It was at once found objectionable on account of the excessive restriction of the groups called genera, there being no less than thirty-nine to one hundred and six species. Prof. Zeller, (Ent. Zeit. Stet. 1874), might well ask, "what would become of us if all the Hesperians of the world, and all the Lepidoptera also, were thus split up into such genera. The least result would be that the difficulty of determining the species would resolve itself into the greater one of determining the genus." Some few of these groups would doubtless stand as genera, if defined, but in most cases, there is no reason why several should not be embraced in a single genus. That I gave them currency and endorsement through the Synopsis has been a matter for regret.

Inasmuch as the Hesperidæ undoubtedly needed revision, Dr. Otto Speyer kindly consented, at the request of Mr. Lintner, to undertake the task. It is believed that the arrangement proposed by him will be satisfactory. But it must not be forgotten that any present arrangement of this family, much more for one geographical section of it, is only provisional. Of this Dr Speyer himself writes: "A systematic treatment of the Hesperidæ is a very difficult task, and, according to my opinion, can only be accomplished with reference to the whole known family, in all parts of the world, of which the American Hesperians form only a small fragment. But as there exists at present no general system for this family answering all demands, and as there is not likely to be one very soon, local specialists are obliged to confine themselves, whether they will or not, to their own species. Even for the European fauna, we have been obliged to content ourselves with a highly deficient provisional grouping of the Hesperians, so imperfect indeed, that I have not been able yet to accept these so-called genera, and in my own collection, I still bring everything under the name Hesperia,—a procedure allowable, under the circumstances, for the European fauna, poor in species, but not suitable for the richer American fauna."

W. H. EDWARDS.

Coalburgh, W. Va. Feb. 1877.

NAMES OF AUTHORS AND WORKS QUOTED

AND ABBREVIATIONS USED.

AGASSIZ, L.—Lake Superior, 1850.
AM. ENT.—American Entomologist, St. Louis, 1869–70.
AM. NAT.—American Naturalist.
ANN. N. Y. LYC. N. HIST.—Annals of the New York Lyceum of Natural History.
ANN. SOC. ENT. FR.—Annals de la Societé Entomologique de France.
BATES, H. W.
BEHR, Dr. Hermann.
BETHUNE, Rev. C. J.
BLANCH.—Blanchard.
BD.—Dr. Boisduval, Icones historique des Lepidopteres, 1833.
Species General des Lepidopteres I, 1836.
Lepidopteres de la Californie, 1869.
BD.-LEC.—Boisduval and Leconte. Lepidopteres de l'Amerique septentrionale, 1833.
BUL. BUF. SOC. N. SCI.—Bulletin of the Buffalo Society of Natural Sciences.
BUTLER, A. G.—Lepidoptera Exotica, 1869–74.
Catalogue of the Satyridæ in the British Museum, 1868.
CAN. ENT.—Canadian Entomologist.
CAN. NAT.—Canadian Naturalist.
CRAM.—Cramer, Papillons Exotiques, 1779–82.
CURTIS.—Appendix to Ross' Arctic Expedition, 1835.
DALM.—Dalman.
DE SAGRA.—Natural History of Cuba.
D'URBAN.
DODGE, G. M.
DOUB.—Doubleday, Edw.
DRURY.—Illustrations of Exotic Entomology, 1770–82.
H. EDW.—Edwards Henry. Pacific Coast Lepidoptera, 1875–77.
EDW.—Edwards, W. H. Butterflies of North America, Vol. I, 1868–72. Vol. II, 1874.
EN. AN. MUS. ST. PETERSBURG.—Enumeratio Corporum Animalium Musei Imperialis Academiæ Scientiarum Petropolitanæ, Part I, 1855–63.
ENC. METH.—Enclopedie Methodique.
ENTOM.—The Entomologist, London.
ENT. MO. MAG.—Entomologist's Monthly Magazine, London.
ESP.—Esper, Die Europaischen Schmetterlinge, 1777–94.
F.—Fabricius. Systema Entomologiæ, 1775.
Species Insectorum II, 1781.
Mantissa Insectorum II, 1787.
Entomologia Systematica III, 1793.

FELD.—Felder, Dr. C. Reise der Novara, 1867.
FISCH.—Fischer. Entomographie de la Russie, 1823–24.
FISHER.
FITCH, Dr. Asa.
FREYER.—Neuere Beitrage zur Schmetterlingskunde, 1831–58.
GEN. DI. LEP.—Genera of Diurnal Lepidoptera. Doubleday, Westwood and Hewitson, 1846–52.
GEYER.—Continuation of Hübner's Exotischer Schmetterlinge.
GODT.—Godart. Encyclopedie Methodique, IX.
GRAY, Dr. Edw.
GROTE, A. R.
GR.-ROB.—Grote and Robinson.
GUERIN.—Iconographie de Regne Animal, 1844.
HARR.—Harris, Dr. T. W. Insects Injurious to Vegetation, 2d. ed., 1862.
HERR.-SCHAEF.—Herrick. Schaeffer.
HEW.—Hewitson, W. C. Exotic Butterflies.
Illustrations of Lycænidæ.
HIST. NAT. DE CUBA.—Memorias sobre la Historia Natural de la Isla de Cuba, Poey, I, 1851.
HUB.—Hübner. Sammlung Europaischer Schmetterlinge, 1793–1827.
Sammlung Exotischer Schmetterlinge, 1816–24.
Zutraege zur Sammlung Exotischer Schmetterlinge, 1818–25.
HUMPH.-WEST.—Humphreys and Westwood. British Butterflies, 1848.
KIRBY, Rev. W.—Fauna Boreali-Americana IV, 1837.
KIRTLAND, Dr. C.
KOLL.—Kollar.
LATR.—Latreille.
LEACH, Dr. W. E.
LED.—Lederer.
LEF.—Lefebore, A.
L.—Linnæus. Museum Ludovicæ Ulricæ Reginæ, 1764.
Systema Naturæ II, 1767.
Mantissa I.
LINTN.—Lintner, J. A. Entomological Contributions.
LUCAS.
MAYNARD, C. J.
MEAD, T. L.—Report upon Geographical and Geological Explorations, etc., in charge of Lt. G. M. Wheeler, Vol. V. Zoology. Diurnal Lepidoptera.
MEN.—Ménétriés, E.
MEM. BOST. SOC. N. HIST.—Memoirs of the Boston Society of Natural History.
MO. ENT. REP.—Missouri Entomological Reports.
MORR.—Morris, Rev. J. G. Synopsis of the described Lepidoptera of North America, 1862.
OCHS.—Ochsheimer. Die Schmetterlinge von Europa, 1807–16.
PACK. GUI.—Packard, Dr. A. S. Jr. A Guide to the Study of Insects, 1869.
PARKER, Rev. H. W.
POEY, Prof. F.—Centurie Lepidopteres de l'ile de Cuba, 1832.
PUTNAM, F. W.
PSYCHE.—Organ of the Cambridge Entomological Club I, 1876.

PR. AM. ASS. ADV. SC.—Proceedings of the American Association for the Advancement of Science.
PR. E. SOC. PH.—Proceedings of the Entomological Society of Philadelphia.
PR. CAL. AC. N. SCI.—Proceedings of the California Academy of Natural Sciences.
PR. BOST. SOC. N. HIST.—Proceedings of the Boston Society of Natural History.
PR. DAVENPORT AC. N. SCI.—Proceedings of the Davenport (Iowa), Academy of Natural Sciences I.
PR. ESS. INS.—Proceedings of the Essex Institute, Salem.
RAMB.—Rambur.
REAK.—Reakirt, T.
REG. ANIM. DE CUV.—Regne Animal de Cuvier.
REV. ZOOL.—Revue Zoologique, Paris.
RIDINGS, James.
REP. HAYD. EXP.—Report on the Geological Survey of Montana, etc., Hayden.
RILEY, C. V.—Missouri Entomological Reports.
SAUND.—Saunders, W.
SAY, Thos.—American Entomology, 1824–28.
SCHRANK.
SCHNEID.—Schneider, D. H.
SCUD.—Scudder, S. H. A Systematic Revision of some of the American Butterflies, 1872.
SILL. JL.—Silliman's American Journal of Science and Arts.
SM.-ABB.—Smith and Abbot. Insects of Georgia, 1797.
SOMM.—Sommer.
SPEYER, Dr. Adolf.
STOLL.—Supplementband zu Papillons Exotiques, (Cramer), 1787–96.
STRECK.—Strecker, H. Lepidoptera, 1872.
SWAINSON, W.
THUNB.—Thunberg. Dissertatio Insecta Suecica II, 1791.
TR. A. E. SOC.—Transactions of the American Entomological Society.
TR. CHIC. AC. N. SCI.—Transactions of the Chicago Academy of Natural Sciences.
TR. ENT. SOC. LOND.—Transactions of the Entomological Society, London.
TR. N. Y. ST. AG. SOC.—Transactions of the New York State Agricultural Society.
VON PRUNN.—Von Prunner. Lepidoptera Pedemontana, 1793.
WALSH, B. D.
WESTWOOD, Prof. J. O.
WHITNEY, C. P.
WIEN. ENT. MONATS.—Wiener Entomologische Monatschrift.

Signs used.—♂, male. ♀, female. ✱, mention of preparatory stages. ✕, species unknown to me, and perhaps not properly classified.

CATALOGUE.

PAPILIONIDÆ.

PAPILIONINÆ.

PAPILIO, L.

1. **Ajax**, L.
   dim. var. WALSHII, Edw. But. N. A. 1, 1, pl. 1, ∗.
   Marcellus, Cram.
   sub.-var. *Abbotii*, Edw. l. c. pl. 1, fig. 6.
   Ajax, Sm.-Abb. pl. 4, ∗.
   dim. var. TELAMONIDES, Feld.—Edw. l. c. 2, pl. 2, ∗.
   Ajax, Bd.-Lec. pl. 1.
   dim. var. MARCELLUS, Bd.-Lec. 8, pl. 2. Edw. l. c. 3, pl. 3, ∗.
   Ajax, Esper.
   Hab.—Pennsylvania to Texas; Mississippi Valley.

2. **Sinon**, F.—Bd. Sp. Gen. 1, 260. Bd.-Lec. 11, pl. 3. Morr. 9.
   Protesilaus, Drury.
   Hab.—Florida, (occasional); Cuba.

3. **Philenor**, L.—Sm.-Abb. pl. 3, ∗. Say, 1, pl. 1. Bd. Sp. Gen. 1, 324. Bd.-Lec. 29, pl. 11, ∗. Morr. 6. Riley, 2d. Mo. Ent. Rep. 116, ∗.
   Astinous, Cram.
   Hab.—Atlantic to Pacific; Canada to Gulf of Mexico.

4. **Villiersii**, Bd.-Lec. 36, pl. 14. Morr. 12.
   Hab.—Florida, (occasional); Cuba.

5. **Machaon**, L.—Morr. 12.
   var. ALIASKA, Scud. Pr. Bost. Soc. N. Hist. 12, 45.
   Hab.—British America; Alaska.

6. **Hippocrates**, Feld. Verh. Zool. Bot. Ges. 14, 314.
   var. OREGONIA, Edw. Tr. A. E. Soc. 5, 208.
   Hab.—Oregon; Columbia River, (coll. H. Edwards).

7. **Zolicaon**, Bd. Ann. Soc. Ent. Fr. 2, 10, 281. Morr. 4. Edw. But. N. A. 2, pl. 6, ✱. H. Edw. Pr. Cal. Ac. N. Sci. 5, 163, ✱. Streck. pl. 6, fig. 3, ♀.

Hab.—Oregon to Arizona; Montana; Colorado.

8. **Indra**, Reak. Pr. E. Soc. Ph. 6, 123. Streck. pl. 2, fig. 1, ♂. Putnam, Proc. Davenport Ac. N. Sci. 1, pl. 35, ♀.

Hab.—Colorado; Nevada.

9. **Pergamus**, H. Edw. Pr. Cal. Ac. N. Sci. 5, 423.

Hab.—Southern California.

10. **Bairdii**, Edw. Pr. E. Soc. Ph. 6, 200. Mead, Rep. Wheeler Exp. 5, 740.

Hab.—Arizona.

11. **Brevicauda**, Saund. in Pack. Guide, 245. Edw. But. N. A. 2, pl. 8, ✱.

Anticostiensis, Streck. pl. 2, fig. 2, ♀.

Hab.—Anticosti; Newfoundland; Quebec.

12. **Asterias**, F.—Bd. Sp. Gen. 1, 332. Bd.-Lec. 14, pl. 4, ✱. Morr. 5. Harr. 263, pl. 4, ✱. Lintn. Pr. E. Soc. Ph. 3, 51, ✱.

Troilus, Sm.-Abb. pl. 1.

Hab.—Atlantic to Pacific; Canada to Gulf of Mexico; Arizona.

var. ASTEROIDES, Reak. Pr. Ac. N. Sci. Ph. 1866, 43. Streck. pl. 6, fig. 4, ♀.

Hab.—Southern States; Arizona; occasional in Northern States.

var. CALVERLEYI, Grote, Pr. E. Soc. Ph. 2, 441, pl. 10, ♂. Edw. But. N. A. 2, pl. 11, ♂ ♀.

Hab.—Occasional on Long Island, (coll. Calverley), and Florida, (coll. Mead).

13. **Americus**, Koll.

Sadalus, Lucas, Rev. Zool. 1852, 133, pl. 10.

Hab.—Southern California; Arizona, (Wheeler Exp.).

14. **Troilus**, L.—Bd. Sp. Gen. 1, 334. Bd.-Lec. 26, pl. 10, ✱. Morr. 5. Harr. 266, ✱. Saund. Can. Ent. 1, 73, ✱.

Ilioneus, Sm.-Abb. pl. 2.

Hab.—Atlantic States; Mississippi Valley.

15. **Eurymedon**, Bd. Ann. Soc. Ent. Fr. 2, 10, 280. Morr. 4. Edw. But. N. A. 2, 1, pl. 1, ✱. H. Edw. Pr. Cal. Ac. N. Sci. 5, 164, ✱. Streck. pl. 4, fig. 1, ♂.
Hab.—California to British Columbia; Arizona to Montana.

16. **Rutulus**, Bd. Ann. Soc. Ent. Fr. 2, 10, 279. Morr. 3. H. Edw. l. c. 5, 165, ✱. Mead, Rep. Wheeler Exp. 5, 741.
Hab.—Pacific States; Rocky Mountains.

17. **Turnus**, L.—Say, pl. 40. Bd. Sp. Gen. 1, 338. Bd.-Lec. 19, pl. 6, 7, ✱. Morr. 2. Harr. 268, fig. 97, 98, ✱. Saund. Can. Ent. 1, 74; ibid, 6, 2, ✱. Lintn. Pr. E. Soc. Phila. 3, 50. Edw. But. N. A. 2, pl. 3, 4, ✱.
Hab.—Atlantic States to Rocky Mountains; British America to Mackenzie's River; Alaska; Canada; Nova Scotia; Newfoundland.

dim. var. ♀ GLAUCUS, L.—Bd.-Lec. 22, pl. 8, 9. Ridings, Pr. E. Soc. Ph. 1, 266. Walsh, l. c. 1, 349. Edw. But. N. A. 2, pl. 6.
Hab.—Southern New York, and Wisconsin to Gulf of Mexico; Kansas to Texas.

18. **Daunus**, Bd. Sp. Gen. 1, 342. Ridings, Pr. E. Soc. 1, 278, fig. 2. Edw. But. N. A. 2, pl. 2. H. Edw. Pr. Cal. Ac. N. Sc. 5, 325, ✱. Streck. pl. 6, fig. 1, 2. Mead, Rep. Wheeler Exp. 5, 741.
Hab.—Arizona to Montana; Oregon.

19. **Pilumnus**, Bd. Sp. Gen. 1, 340. Streck. pl. 2, fig. 3, ♂.
Hab.—Arizona; New Mexico.

20. **Palamedes**, Drury.
Calchas, Bd.-Lec. 17, pl. 5, ✱. Morr. 7.
Hab.—Florida to Virginia; Gulf States.

21. **Cresphontes**, Cram.
Thoas, Bd. Sp. Gen. 1, 355. Bd.-Lec. 31, pl. 12, 13, ✱. Morr. 7.
Hab.—Southern and Western States; occasional in Wisconsin, Michigan and Ontario.

22. **Polydamas**, L.—Bd. Sp. Gen. 1, 321. Bd.-Lec. 37, pl. 15. Morr. 13.
Hab.—Florida; Cuba.

PARNASSIUS, Latr.

23. **Clodius,** Mén.—Edw. But. N. A. 1, 18, pl. 4, fig. 5, 6, ♂.
Hab.—California; Montana.

24. **Baldur.**
Clarius, Edw. (nec. Eversm.), l. c. pl. 4, fig. 1—4, ♂ ♀.
Hab.—California, Sierras; Utah; Montana.
var. MÉNÉTRIÉSII, H. Edw. Pr. Cal. Ac. N. Sci. v. 6.
Hab.—California.

25. **Smintheus,** Doub. Gen. Di. Lep. pl. 4. Edw. l. c. 1, 21, pl. 5—7. Mead, Rep. Wheeler Exp. 5, 742.
Sayii, Edw.
Hab.—Rocky Mountains; Montana to New Mexico; California.
var. BEHRII, Edw. l. c. pl. 6, fig. 3, 4.
Hab.—Colorado; California.

26. **Nomion,** Fisch.—Bd. Sp. Gen. 1, 397, pl. 2. Morr. 14.
Hab.—Alaska, Sitka, (coll. Behr.); Siberia.

27. **Eversmanni,** Mén.—Scud. Pr. Bost. Soc. N. Hist. 12, 45. Edw. l. c. 1, 25, pl. 7, fig. 6, 7.
Hab.—Alaska; Siberia.

PIERINÆ.

PIERIS, Schrank.

28. **Ilaire,** Godt.—Poey, Cent. Lep. Cuba, pl. Bd. Sp. Gen. 491.
Hab.—Florida, occasional; (coll. Mead).

29. **Monuste,** L.—Bd. Sp. Gen. 1, 495. Morr. 16.
Cleomes, Bd.-Lec. 43, pl. 16, ✱.
Hab.—Southern States; Texas.

30. **Menapia,** Feld.—Morr. 19. Edw. But. N. A. 1, 27, pl. 8, ♂; id. Suppl. Notes, l. c. 1, ♀. Streck. pl. 2, fig. 4, ♀. H. Edw. Pr. Cal. Ac. N. Sci. 5, 165, ✱. Mead, Rep. Wheeler Exp. 5, 743.
Tau, Scud. Pr. Bost. Soc. N. Hist. 3, 183.
Ninonia, Bd.
Hab.—California; Oregon; Colorado; Vancouver's Island.

31. **Beckerii,** Edw. But. N. A. 1, 28, pl. 8. Mead, l. c. 5, 745.
Hab.—Utah; Nevada; Arizona.

32. **Sisymbri**, Bd. Ann. Soc. Ent. Fr. 2, 10, 284. Morr. 17.
Hab.—California.

33. **Occidentalis**, Reak. Pr. E. Soc. Ph. 6, 133. Mead, Rep. Wheeler Exp. 5, 745.
Hab.—Rocky Mountains to the Pacific.

34. **Calyce**, Edw. Tr. A. E. Soc. 3, 189.
Hab.—Nevada, (perhaps spring form of *Occidentalis*).

35. **Protodice**, Bd.-Lec. 45, pl. 17. Morr. 17. Riley, 2d. Mo. Ent. Rep. 104, ∗.
dim. var. VERNALIS, Edw. Pr. E. Soc. Ph. 2, 501; id. But. N. A. 1, 31, pl. 9.
Nasturtii, Edw.
Hab.—Middle, Southern and Western States, to Pacific.

36. **Oleracea**, Bd. Spec. Gen. 1, 518. Harr. 270, fig. 99; id. in Agassiz' Lake Superior, 386, pl. 7, fig. 1. Morr. 19. Riley, 2d. Mo. Ent. Rep. 105. ∗. Lintn. Ent. Cont. 1, 28, ∗. Bethune, Can. Ent. 5, 37, ∗.
Cruciferarum, Bd.
Casta, Kirby, Faun. Bor. Am. 4, pl. 3, fig. 1.
Iberidis, Bd.
Hab.—Northern States; Rocky Mountains; New Mexico; California; British America; Canada; Nova Scotia.

37. **Virginiensis**, Edw. Tr. A. E. Soc. 3, 13; id. But. N. A. 1, 32, pl. 9.
Hab.—West Virginia; occasional in New York and Canada.

38. **Napi**, L.
dim. var. PALLIDA, Scud. Pr. Bost. Soc. N. Hist. 3, 183.
Castoria, Reak.
Nasturtii, Bd.
Napi, Streck. pl. 8, fig. 4, 5.
dim. var. NAPÆÆ, Esper.
Venosa, Scud. l. c. 8, 182.
Frigida, Scud. l. c. 8, 181.
Napi, Streck. pl. 8, fig. 2, 3.
Hab.—California to British Columbia and Alaska; Labrador.
dim. var. BRYONIÆ, Ochs.
Hulda, Edw. (arctic form), Tr. A. E. Soc. 2, 370.
Hab.—Kodiak.

39. **Rapæ**, L.—Riley, 2d. Mo. Ent. Rep. 108, *.
dim. var. MARGINALIS, Scud. Pr. Bost. Soc. N. Hist. 8, 182.
Rapæ, Streck. pl. 8, fig. 6.
dim. var. YREKA, Reak. Proc. Ac. N. Sci. Ph. 1866, 32.
Resedæ, Bd.
Rapæ, Streck. pl. 8, fig. 7.
var. NOV.-ANGLIÆ, Scud. Can. Ent. 4, 79. Streck. pl. 8, fig. 8.
Hab.—United States; British Columbia; Canada; Nova Scotia.

NATHALIS, Bd.

40. **Iole**, Bd. Sp. Gen. 1, 589. Morr. 12. Mead, Rep. Wheeler Exp. 5, 747.
var. *Irene*, Fitch, Tr. N. Y. St. Ag. Soc. 1856, 485.
Hab.—Missouri to California; New Mexico; Arizona.

ANTHOCHARIS, Bd.

41. **Lanceolata**, Bd. Ann. Soc. Ent. Fr. 2, 10, 284. Morr. 21. Streck. pl. 6, fig. 5.
Edwardsii, Behr.
Hab.—California.

42. **Creusa**, Doub. Gen. Di. Lep. pl. 7.
Hyantis, Edw. Tr. A. E. Soc. 3, 205.
Hab.—Colorado to California; Rocky Mountains.

43. **Olympia**, Edw. l. c. 3, 266; id. But. N. A. 2, pl. 1 of Anth.
Hab.—West Virginia; Missouri; Kansas; Texas.

44. **Ausonides**, Bd. Lep. de la Cal. 40. Edw. But. N. A. 2, pl. 1 of Anth. *; id. Pr. E. Soc. Ph. 2, 81. Mead, Rep. Wheeler Exp. 5, 747.
Hab.—Colorado to California; Rocky Mountains.

45. **Cethura**, Feld. Reise Nov. 2, 182, pl. 25.
Cooperii, Behr.—Edw. But. N. A. 1, 36, pl. 10.
Angelina, Bd.
Hab.—Southern California.

46. **Sara**, Bd. Ann. Soc. Ent. Fr. 2, 10, 285. Morr. 21. Edw. But. N. A. 1, 37, pl. 11.
Hab.—California.

47. **Reakirtii**, Edw. Tr. A. E. Soc. 2, 369; id. But. N. A. 1, 35, pl. 10.
Hab.—California.

48. **Julia**, Edw. Tr. A. E. Soc. 4, 61. Streck. pl. 6, fig. 6, 7. Mead, Rep. Wheeler Exp. 5, 748.
Hab.—Colorado; New Mexico; Arizona.

49. **Genutia**, Bd. Sp. Gen. 1, 565. Morr. 20.
Hab.—New York to Virginia; Western States; Texas.

CALLIDRYAS, Bd.

50. **Eubule**, L.—Sm.-Abb. pl. 5, ✱. Bd. Sp. Gen. 1, 613. Morr. 25. Bd.-Lec. 74, pl. 24. Butler, Lep. Exot. 58, pl. 22.
Hab.—Southern States; occasional in Mississippi Valley; Ohio; Arizona; West Virginia and Long Island.

51. **Sennæ**, L.—Butler, l. c. 59, pl. 23.
♂ *Marcellina*, Cram.
♀ *Eubule*, Cram.
var. ♀ *Orbis*, Poey, Cent. Lep. Cuba, pl.
Hab.—Florida; Texas; Kansas; Nebraska, occasional; (coll. Dodge).

52. **Agarithe**, Bd. Sp. Gen. 1, 623. Butler, l. c. 121, pl. 45.
Hab.—Texas; (auct. Butl.).

53. **Philea**, L.—Bd. Sp. Gen. 1, 619. Butler, l. c. 92, pl. 35.
Hab.—Texas, occasional; also Illinois, (Am. Ent. 2, 340).

GONEPTERYX, Leach.

54. **Lyside**, Godt.—Bd. Sp. Gen. 1, 603. Morr. 24.
Hab.—Texas.

COLIAS, F.

Group I.

55. **Eurydice**, Bd. Ann. Soc. Ent. Fr. 3, 1855, 32. Edw. But. N. A. 1, 51, pl. 16. H. Edw. Proc. Cal. Ac. N. Sci. v. 6, ✱.
Wosnesenski, Mén.—Morr. 32.
♀ *Rhamni*, Bd.
Hab.—California; Oregon; Arizona.

56. **Cæsonia**, Stoll.—Bd. Spec. Gen. 1, 635. Morr. 27. Bd.-Lec. 67, pl. 22.
Hab.—Southern States; Miss. Valley; Kansas; Texas; Ariz.

Group II.

57. **Meadii**, Edw. Tr. A. E. Soc. 3, 267; id. But. N. A. 1, 58, pl. 19. Mead, Rep. Wheeler Exp. 5, 750.
Hab.—Colorado; Montana; New Mexico.

Group III.

58. **Hecla**, Lef. Ann. Soc. Ent. Fr. 5, 384.
Hab.—Greenland; Disco Island.

59. **Boothii**, Curtis, App. Ross Exp. 65, pl. A, fig. 3—5.
var. *Chione*, Ross, l. c. fig. 5, 6.
Hab.—Arctic America.

60. **Eurytheme**, Bd. Ann. Soc. Ent. Fr. 2, 10, 286. Morr. 29. Edw. But. N. A. 1, 43, pl. 14. H. Edw. Proc. Cal. Ac. N. Sci. 5, 162, ∗. Mead, Rep. Wheeler Exp. 5, 748.
Amphidusa, Bd.
Eduza, var. *Californica*, Mén.
Hab.—Southern and Western States to the Pacific; occasional in Middle States, Ontario and Quebec.

61. **Keewaydin**, Edw. But. N. A. 1, 47, pl. 15.
var. *Ariadne*, Edw. Tr. A. E. Soc. 3, 12.
Hab.—Southern, Western States to Pacific.

62. **Christina**, Edw. Pr. E. Soc. Ph. 2, 79; id. But. N. A. 1, 41, pl. 13.
Hab.—British America, Great Slave Lake; Athabasca.

63. **Astræa**, Edw. Tr. A. E. Soc. 4, 61.
Hab.—Montana.

Group IV.

64. **Eriphyle**, Edw. Tr. A. E. Soc. 5, 202.
Hab.—British Columbia.

65. **Philodice**, Godt.—Bd.-Lec. 64, pl. 21. Morr. 29. Harr. 272, figs. 100—102, ∗. Saund. Can. Ent. 1, 54, ∗. Riley, 2d. Ag. Rep. Mo. 116, ∗. Edw. But. N. A. 2, pl. 2, 3 of Colias, ∗.
var. *Anthyale*, Hüb.
Hab.—United States east of Rocky Mountains; British America; Canada; Nova Scotia.

66. **Chrysomelas**, H. Edw. Pr. Cal. Ac. N. Sci. v. 6.
Hab.—California.

67. **Occidentalis**, Scud. Pr. Bost. Soc. N. Hist. 9, 109. Edw. But. N. A. 1, 55, pl. 18.
Hab.—British America; Slave River; Caribeo.

68. **Interior**, Scud. l. c. 9, 108.
Solivaga, H. Edw. l. c. v. 6.
Hab.—British America; Ontario; Quebec; Alaska.

69. **Emilia**, Edw. Tr. A. E. Soc. 3, 12.
Hab.—California.

70. **Harfordii**, H. Edw. Pr. Cal. Ac. N. Sci. v. 6.
Hab.—California.

71. **Barbara**, H. Edw. l. c. v. 6.
Hab.—California.

72. **Scudderii**, Reak. Pr. E. Soc. Ph. 4, 217. Edw. But. N. A. 1, 57, pl. 19. Mead, Rep. Wheeler Exp. 5, 749.
Hab.—Colorado; Montana; Utah; British Columbia.

73. **Alexandra**, Edw. Pr. E. Soc. Ph. 2, 14, pl. 11; id. But. N. A. 1, 39, pl. 12. Mead, l. c. 5, 749.
Hab.—Colorado; Rocky Mountains.

74. **Laurentina**, Scud.
Philodice, var. *Laurentina*, Scud., Pr. Bost. Soc. N. Hist. 18, 4.
Hab.—Cape Breton Island; Quebec; Maine.

75. **Pelidne**, Bd. Sp. Gen. 1, 644. Bd.-Lec. 66. Morr. 30. Edw. But. N. A. 2, pl. 1 of Colias.
Labradorensis, Scud. Pr. Bost. Soc. N. Hist. 9, 107.
Hab.—Labrador; Alaska, (coll. Behr.).

76. **Nastes**, Bd. Sp. Gen. 1, 648. Morr. 30. Edw. But. N. A. 2, pl. 1 of Colias.
Hab.—Labrador.

77. **Chippewa**, Edw.
Helena, (pre-occupied), Edw. Pr. E. Soc. Ph. 2, 80; id. But. N. A. 1, 40, pl. 12.
Hab.—British America, Great Slave Lake.

78. **Palæno**, L.—Bd. Sp. Gen. 1, 645.
Hab.—Labrador; Alaska, (coll. Behr.).

Group V.

79. **Behrii**, Edw. Pr. E. Soc. Ph. 6, 201; id. But. N. A. 1, 42, pl. 13.

Hab.—California, Yosemite.

TERIAS, Swain.

80. **Nicippe**, Cram.—Say, 2, pl. 30. Bd.-Lec. 55, pl. 20, ✱. Morr. 33.

Hab.—Pennsylvania to Gulf; Mississippi Valley; Arizona.

81. **Proterpia**, F.—Bd. Sp. Gen. 1, 654. Morr. 35.

Hab.—Texas.

82. **Gundlachia**, Poey, Hist. Nat. de Cuba, 1, 246, pl. 24.

Proterpia, var. A. Bd. Sp. Gen. 1, 655.

Hab.—Texas, (coll. Boll.).

83. **Westwoodi**, Bd. Sp. Gen. 1, 666.

Hab.—Texas, (coll. Mead).

84. **Mexicana**, Bd. Sp. Gen. 1, 655, pl. 3. Morr. 36.

Hab.—Texas to Arizona; California; occasional in Kansas and Nebraska, (coll. Dodge).

85. **Lisa**, Bd. Sp. Gen. 1, 661. Bd.-Lec. 53, pl. 19, ✱. Morr. 34.

Hab.—Rhode Island to Gulf of Mexico; Texas; Western States; Kansas.

86. **Delia**, Cram.—Bd. Sp. Gen. 1, 663. Bd.-Lec. 49, pl. 18, ✱. Morr. 34.

Hab.—Gulf States.

87. **Jucunda**, Bd. Sp. Gen. 1, 665. Bd.-Lec. 52, pl. 19. Morr. 35.

Hab.—Gulf States.

NYMPHALIDÆ.

HELICONINÆ.

HELICONIA, Latr.

88. **Charitonia**, L.—Bd.-Lec. 140, pl. 41. Morr. 39.

Hab.—Florida; Georgia; South Carolina, (coast, sea islands).

DANAINÆ.

DANAIS, Latr.

89. **Archippus**, F.—Sm.-Abb. pl. 6, ✱. Morr. 38. Bd.-Lec. 137, pl. 40, ✱. Harr. 280, ✱. Saund. Can. Ent. 5, 4, ✱. Riley, 3rd. Mo. Ent. Rep. 143, ✱. Edw. Can. Ent. 8, 119, ✱. Scud. Psyche, 1, 81, ✱.
Plexippus, Say, 3, pl. 54.
Hab.—United States; British America; Canada; Nova Scotia.

90. **Berenice**, Cram.—Bd.-Lec. 134, pl. 39, ✱. Morr. 37.
Gilippus, Sm.-Abb. pl. 7, ✱.
Hab.—Southern States; Colorado; Arizona.

91. **Strigosa**, Bates, Ent. Mo. Mag. 1, 32.
Hab.—Texas.

NYMPHALINÆ.

COLÆNIS, Doub.

92. **Julia**, F.
Alcionea, Cram. 3, pl. 215, fig. A. F. G.
Hab.—Texas, occasional; (coll. Belfrage).

93. **Delila**, F.
Cillene, Cram. 3, pl. 215, fig. D. E.
Hab.—Texas, occasional; (coll. Belfrage).

AGRAULIS, Blanch.

94. **Vanillæ**, L.—Bd.-Lec. 143, pl. 42, ✱. Morr. 40.
Passifloræ, Sm.-Abb. pl. 12.
Hab.—Southern States; California; Arizona; occasional in West Virginia.

ARGYNNIS, F.

Group I.

95. **Diana**, Cram.—Say, 1, pl. 17, ♂. Edw. Pr. E. Soc. Ph. 3, 431, ♀; id. But. N. A. 1, 61, pl. 20; id. l. c. 2, pl. 7 of Argyn. ✱; id. Can. Ent. 6, 121, ✱.
Hab.—West Virginia to Georgia; Kentucky; Arkansas.

96. **Nokomis**, Edw. Pr. Ac. N. Sc. Ph. 1862, 221; id. But. N. A. 1, 71, pl. 23. Mead, Rep. Wheeler Exp. 5, 751, pl. 35.
Hab.—Arizona.

97. **Leto,** Behr. Pr. Cal. Ac. N. Sc. 2, 173. Edw. But. N. A. 1, 83, pl. 29.
Hab.—California; Oregon.

98. **Idalia,** Drury.—Bd.-Lec. 147, pl. 43. Morr. 41. Harr. 285, fig. 110.
Hab.—Massachusetts to Nebraska; Arkansas.
var. ASHTAROTH, Fisher, Pr. Ac. N. Sc. Ph. 1858, 179, pl. 2; id. l. c. 1859, 352. Morr. 47.
Hab.—New Jersey.

99. **Nitocris,** Edw. Tr. A. E. Soc. 5, 15. Mead, Rep. Wheeler Exp. 5, 751.
Hab.—Arizona.

100. **Cybele,** F.—Edw. But. N. A. 1, 65, pl. 21; id. Can. Ent. 6, 121, ♂. Saund. l. c. 4, 121, ♂.
Hab.—Atlantic and Western States to Kansas; Nebraska; Canada.

101. **Carpenterii,** Edw. Tr. A. E. Soc. 5, 204.
Hab.—Arizona.

102. **Aphrodite,** F.—Edw. But. N. A. 1, 69, pl. 22; id. Can. Ent. 6, 121, ♂. Harr. 286, fig. 111, ♀.
Hab.—Northern and Middle States; Kansas; Nebraska; Canada; Nova Scotia.

103. **Alcestis,** Edw. l. c. 5, 289.
Hab.—Illinois; Iowa; Colorado.

104. **Atlantis,** Edw. Pr. Ac. N. Sci. Ph. 1862, 54; id. But. N. A. 1, 73, pl. 24. Pack. Guide, 252, ♂. Edw. Can. Ent. 9, Feb. 1877, ♂. Mead, Rep. Wheeler Exp. 5, 754.
Hab.—New England; New York; Iowa; Colorado; British America, Columbia to Nova Scotia.

105. **Columbia,** H. Edw. Pr. Cal. Ac. N. Sci. 6, 1877.
Hab.—British Columbia.

106. **Nausicaa,** Edw. Tr. A. E. Soc. 5, 104. Mead, l. c. 5, 752.
Hab.—Arizona.

107. **Bremnerii,** Edw. l. c. 4, 63; id. But. N. A. 2, pl. 4 of Argyn.
Hab.—Oregon; British Columbia; Vancouver's Island; Montana, (auct. Scud.).

108. **Behrensii**, Edw. l. c. 2, 370; id. But. N. A. 1, 87, pl. 31.
Hab.—California, Mendocino.

109. **Bischoffii**, Edw. l. c. 3, 189; id. But. N. A. 2, pl. 3 of Argyn.
Hab.—Alaska.

110. **Opis**, Edw. l. c. 5, 105; id. But. N. A. 2, pl. 3 of Argyn.
Hab.—British Columbia, Bald Mountain.

111. **Rhodope**, Edw. l. c. 5, 13; id. But. N. A. 2, pl. 6 of Argyn.
Hab.—British Columbia.

112. **Halcyone**, Edw. But. N. A. 1, 81, pl. 28. Mead, l. c. 5, 754.
Hab.—Colorado; Wyoming.

113. **Coronis**, Behr. Pr. Cal. Ac. N. Sci. 2, 173, "No. 2." Edw. Pr. E. Soc. Ph. 3, 435.
Juba, Bd.
Hab.—California.

114. **Callippe**, Bd. Ann. Soc. Ent. Fr. 2, 10, 302. Morr. 46. Edw. But. N. A. 1, 75, pl. 25.
Hab.—California.

115. **Liliana**, H. Edw. Pr. Cal. Ac. N. Sci. 6, Dec. 1876.
Hab.—California.

116. **Nevadensis**, Edw. Tr. A. E. Soc. 3, 14; id. But. N. A. 1, 91, pl. 33.
Hab.—Nevada; Utah; Montana; British America, Rocky Mountains.

117. **Edwardsii**, Reak. Pr. E. Soc. Ph. 6, 137. Edw. But. N. A. 1, 85, pl. 30. Mead, l. c. 5, 754.
Hab.—Colorado; Montana.

118. **Meadii**, Edw. Tr. A. E. Soc. 5, 67; id. But. N. A. 2, pl. 2 of Argyn. Mead, l. c. 5, 755.
Hab.—Colorado; Montana; Utah.

119. **Rupestris**, Behr, Pr. Cal. Ac. N. Sci. 2, 175, "No. 6;" id. l. c. 3, pl. 84. Edw. But. N. A. 2, pl. 7 of Argyn.
Hab.—California, Soda Spring.

120. **Inornata**, Edw. Tr. A. E. Soc. 4, 64; id. But. N. A. 2, pl. 5 of Argyn.
Hab.—California; Nevada.

121. **Adiante**, Bd. Lep. de la Cal. 61.
Adiaste, Edw. Pr. E. Soc. Ph. 3, 436.
Hab.—California.

122. **Clio**, Edw. Tr. A. E. Soc. 5, 106.
Hab.—Colorado; Montana.

123. **Eurynome**, Edw. l. c. 4, 66; id. But. N. A. 2, pl. 8 of Argyn. Mead, l. c. 5, 755.
Astarte, Edw. (not Doubl.).
Hab.—Colorado.

124. **Montivaga**, Behr. Pr. Cal. Ac. N. Sci. 2, 174, "No. 4;" id. l. c. 3, 84.
Egleis, Bd.
Hab.—California, Sierras.

125. **Mormonia**, Bd. Lep. de la Cal. 58.
Hab.—California.

126. **Irene**, Bd. Lep. de la Cal. 59, (in *Egleis*).
Hab.—California.

127. **Hesperis**, Edw. Pr. E. Soc. Ph. 2, 502; id. But. N. A. 1, 77, pl. 26. Mead, l. c. 5, 754.
Hab.—Colorado; Montana; Utah.

128. **Zerene**, Bd. Ann. Soc. Ent. Fr. 2, 10, 303. Behr. Proc. Cal. Ac. N. Sci. 2, 175, "No. 9." Edw. But. N. A. 1, 89, pl. 32.
Hydaspe, Bd.
Hab.—California.

129. **Monticola**, Behr. Pr. Cal. Ac. N. Sci. 2, 175, "No. 8;" id. l. c. 3, 84. Edw. But. N. A. 1, 79, pl. 27.
Hab.—California; Oregon.

var. PURPURASCENS, H. Edw. Pr. Cal. Ac. N. Sc. 6, Dec. 1876.
Hab.—Oregon.

Group II.

130. **Myrina**, Cram.—Say, 3, pl. 46. Bd.-Lec. 155, pl. 45. Morr. 45. Harr. 286, fig. 112. Saund. Can. Ent. 1, 55, ∗. Edw. Can. Ent. 8, 161, ∗.
Hab.—Eastern, Middle, and North-western States; British America; Canada; Nova Scotia.

131. **Triclaris**, Hüb.—Scud. Pr. Bost. Soc. N. Hist. 17, 37. Mead, l. c. 5, 757.
Ossianus, Bd.-Lec. 157. Morr. 48.
Hab.—Colorado; Rocky Mountains; British America; Labrador.

132. **Helena**, Edw. Tr. A. E. Soc. 3, 268. Mead, l. c. 5, 757.
Hab.—Colorado; Montana; New Mexico.

133. **Chariclea**, Schneid.—Bd. Spec. Gen. 1, pl. 11, fig. 2. Bd.-Lec. 161. Scud. Pr. Bost. Soc. N. Hist. 17, 40. Morr. 49.
Hab.—Colorado; British America; Columbia; Labrador; Greenland.

134. **Boisduvalii**, Somm. in Bd. Icones, 1, 98, pl. 20.
Hab.—British America; Columbia.

135. **Freya**, Thunb.—Hüb. Eur. Sch. 1, fig. 55, 56. Morr. 46. Scud. l. c. 17. Mead, l. c. 5, 756.
Tarquinius. Curtis.
Hab.—Colorado; Rocky Mountains; British America.

136. **Montinus**, Scud. Pr. Ess. Ins. 3, 166; id. Pr. Bost. Soc. N. Hist. 7, 626, pl. 14.
Hab.—New Hampshire, White Mountains.

137. **Polaris**, Bd. Icones, pl. 20. Sp. Gen. 1, pl. 11, fig. 1. Bd.-Lec. 159. Scud. l c. 17, 46. Morr. 48.
Hab.—Arctic America; Greenland; Labrador.

138. **Frigga**, Thunb.—Scud. l. c. 17, 49. Hüb. Eur. Sch. 1, fig. 49, 50.
Hab.—British America; Labrador; Colorado; Rocky Mountains.

139. **Bellona**, F.—Bd.-Lec. 164, pl. 45. Morr. 45. Harr. 287, fig. 113, 114.
Hab.—Northern United States; Rocky Mountains; California; British America; Canada.

140. **Epithore**, Bd. Lep. de la Cal. 58. Edw. Pr. E. Soc. Ph. 2, 504. Mead, l. c. 5, 756.
Hab.—California; Oregon; Colorado.

141. **Improba**, Butler, Ent. Mo. Mag. 13, 206.
Hab.—Arctic America, Cambridge Bay.

EUPTOIETA, Doub.

142. **Claudia,** Cram. 1, pl. 69, fig. E. F. Mead, Rep. Wheeler Exp. 5, 750, *. Edw. Can. Ent. 2, 163, *.
Columbina, Bd.-Lec. 153, pl. 44. Morr. 44.
Hab.—New York to the Gulf of Mexico; Mississippi Valley; Colorado; Arizona; California.

143. **Hegesia,** Cram. 3, pl. 209, fig. E. F.
Columbina, F.
Hab.—Southern California, occasional; (coll. H. Edw.).

MELITÆA, F.

Group I.

144. **Phæton,** Drury.—Bd.-Lec. 167, pl. 47. Morr. 50. Harr. 288, fig. 115. Edw. But. N. A. 2, pl. 1 of Melitæa, *.
Hab.—United States east of Rocky Mountains; Canada; Lake of the Woods.

145. **Chalcedon,** Doub. Gen. Di. Lep. pl. 23. Edw. But. N. A. 1, 95, pl. 34. H. Edw. Pr. Cal. Ac. N. Sci. 5, 167, *.
Hab.—California.

146. **Cooperi,** Behr. Pr. Cal. Ac. N. Sci. 3, 90.
Hab.—California.

147. **Anicia,** Doub. Gen. Di. Lep. pl. 23. Edw. Pr. E. Soc. Ph. 1, 223. Mead, Rep. Wheeler Exp. 5, 758.
Hab.—California; Nevada; Colorado; Montana.

148. **Nubigena,** Behr. Pr. Cal. Ac. N. Sci. 3, 91. Mead, l. c. 5, 758, *.
Hab.—California; Colorado; New Mexico; Montana.

149. **Quino,** Behr. l. c. 3, 90.
Hab.—California, Mendocino.

150. **Editha,** Bd. Ann. Soc. Ent. Fr. 2, 10, 304. Morr. 51. H. Edw. Proc. Cal. Ac. N. Sci. 5, 167.
Hab.—California.

151. **Helvia,** Scud. Pr. Bost. Soc. N. Hist. 12, 43.
Hab.—Alaska.

152. **Sterope,** Edw. Tr. A. E. Soc. 3, 190.
Hab.—Oregon.

Group II.

153. **Palla**, Bd. Ann. Soc. Ent. Fr. 2, 10, 305. Morr. 52. Behr. Pr. Cal. Acad. N. Sci. 3, 88. H. Edw. id. 5, 167, ∗.
var. HELCITA, Bd. Lep. de la Cal. 55.
Hab.—California; Nevada.

154. **Hoffmanni**, Behr. l. c. 3, 89.
var. WHITNEYII, Behr. l. c. 3, 88.
Hab.—California; Nevada.

155. **Gabbii**, Behr. l. c. 3, 89.
Sonoræ, Bd.
Hab.—Southern California.

156. **Acastus**, Edw. Tr. A. E. Soc. 5, 16. Mead, Rep. Wheeler Exp. 5, 761.
Hab.—Nevada; Utah; Montana.

Group III.

157. **Leanira**, Bd. Lep. de la Cal. 57. Behr. Pr. Cal. Acad. N. Sci. 3, 91. Mead, l. c. 5, pl. 37.
Hab.—California; Arizona.
var. OBLITERATA, H. Edw. Pr. Cal. Ac. N. Sci. 6, Dec. 1876.
Hab.—California.

158. **Thekla**, Edw. Tr. A. E. Soc. 3, 191.
Hab.—Southern California; Arizona.

159. **Minuta**, Edw. Pr. Ac. N. Sc. Ph. 1861, 161. Mead, l. c. 5, pl. 36.
Arachne, Edw.
Hab.—Colorado; Arizona; New Mexico; Texas.

PHYCIODES, Doub.

Group I.

160. **Harrisii**, Scud. Pr. Ess. Ins. 3, 167.
Hab.—New England; New York; Canada.

161. **Nycteis**, Doub. Gen. Di. Lep. pl. 23. Riley, Pr. Am. Ass. Adv. Sc. 1874, 108, ∗. Lintn. Ent. Cont. 1, 26, ∗. Edw. Can. Ent. 5, 224, ∗. Mead, Rep. Wheeler Exp. 5, 762.
Ismeria, Harr.
Oenone, Scud.
Harrisii, Saund. Can. Ent. 4, 161, ∗. Edw. id. 2, 163.
Hab.—New England to Colorado; Montana; Texas; Canada.

162. **Carlota**, Reak. Pr. E. Soc. Ph. 6, 141. Mead, l. c. 5, 762.
Hab.—Southern and Western States; Rocky Mountains; occasional in West Virginia.

Group II.

163. **Vesta**, Edw. Tr. A. E. Soc. 2, 371.
Hab.—Texas.

164. **Phaon**, Edw. Pr. E. Soc. Ph. 2, 505.
Hab.—Gulf States; Texas; Kansas, occasional; (coll. Snow.).

165. **Tharos**, Drury.
dim. var. MARCIA, Edw. Tr. A. E. Soc. 2, 207; id. Can. Ent. 9, 1, ✱.
dim. var. MORPHEUS, F.—Drury, 1, pl. 21, ♀.
Cocyta, Cram. 2, pl. 101, fig. A. B. ♂.
Tharos, Bd.-Lec. 170, pl. 47. Mead, Can. Ent. 7, 161, ✱.
Pharos, Harr. 289, fig. 116, 117.
aberr. *Packardii*, Saund. in Pack. Guide, 256.
Hab.—United States excluding Pacific States; New Mexico; British America to Pacific; Southern Labrador; Anticosti; Nova Scotia.

166. **Batesii**, Reak. Pr. E. Soc. Ph. 5, 226.
Hab.—Virginia to New York.

167. **Pratensis**, Behr. Pr. Cal. Ac. N. Sci. 3, 86.
♀ *Campestris*, Behr. l. c. 3, 86.
Pulchella, Bd.
Hab.—California; Oregon.

168. **Camillus**, Edw. Tr. A. E. Soc. 3, 268.
♀ *Emissa*, Edw. l. c. 3, 269. Mead, Rep. Wheeler Exp. 5, 764.
Pallida, Edw.
Mata, Reak.—Streck. pl. 8, fig. 11. Mead, l. c. 5, 763.
Hab.—Colorado; Rocky Mountains; Montana; Texas; Kansas.

169. **Orseis**, Edw. Tr. A. E. Soc. 3, 206.
Hab.—California, Sierras; Oregon; (perhaps dim. var. of *Pratensis*, winter form).

170. **Mylitta**, Edw. Pr. Ac. N. Sci. Ph. 1861, 160. H. Edw. Pr. Cal. Ac. N. Sci. 5, 167, ✱.
Collina, Behr.
Epula, Bd.
Hab.—California; Arizona.

171. **Montana**, Behr. Pr. Cal. Ac. N. Sci. 3, 85.
Orsa, Bd.
Hab.—California, Sierras; Lake Tahoe.

172. **Picta**, Edw. Pr. E. Soc. Ph. 4, 201. Streck. pl. 8, fig. 10.
Hab.—Colorado; Nebraska, (coll. Dodge).

173. **Canace**, Edw. Tr. A. E. Soc. 3, 206.
Hab.—Arizona.

ERESIA, Doub.

174. **Frisia**, Poey, Cent. Lep. Cuba, pl. 2.
Gyges, Hew.
Hab.—Key West.

175. **Texana**, Edw. Pr. E. Soc. Ph. 2, 81.
Cincta, Edw.
Smerdis, Hew.
Hab.—Texas; Florida.

176. **Punctata**, Edw. Tr. A. E. Soc. 3, 191.
Hab.—Arizona; New Mexico.

SYNCHLOE, Bd.

177. **Janais**, Drury, 3, pl. 17.
Hab.—Texas.

178. **Mediatrix**, Feld.—Reise Novara, 3, 395.
(*Saundersii*, Edw. Synop.).
Hab.—Texas.

179. **Adjutrix**, Scud. Syn. List, 1875, 269.
(*Lacinia*, Edw. Synop.).
Hab.—Texas.

180. **Erodyle**, Bates, Ent. Mo. Mag. 1, 84.
Hab.—Texas.

181. **Crocale**, Edw. Tr. A. E. Soc. 5, 17. Mead, Rep. Wheeler Exp. 5, 765, pl. 37.
Hab.—Arizona.

CYSTINEURA, Bd.

182. **Amymone**, Men. En. An. Mus. St. Petersburg, 1, 123, pl. 9.
Hab.—Texas.

GRAPTA, Kirby.

183. **Interrogationis**, F.

dim. var. UMBROSA, Lintn. Tr. A. E. Soc. 2, 313. Edw. But. N. A. 1, 109, pl. 38.

dim. var. FABRICII, Edw. Tr. A. E. Soc. 3, 5; id. But. N. A. 1, 113, pl. 39, ∗.

C Aureum, Bd.-Lec. 192, pl. 51.

Interrogationis, Harr. 298, fig. 124.

Hab.—United States except Pacific; Arizona; Canada; Nova Scotia.

184. **Comma**, Harr.

dim. var. HARRISII, Edw. Can. Ent. 5, 184.

Comma, Harr. 300, pl. 4, fig. 1. Lintn. Pr. E. Soc. Ph. 3, 55, ∗. Edw. But. N. A. 1, 99, pl. 36, ∗.

dim. var. DRYAS, Edw. Tr. A. E. Soc. 3, 17; id. But. N. A. 1, 107, pl. 37.

Hab.—Eastern, Middle and Northwestern States; Kansas; Texas; Canada; Nova Scotia.

185. **Satyrus**, Edw. Tr. A. E. Soc. 2, 374; id. But. N. A. 1, 119, pl. 40, ∗. H. Edw. Pr. Cal. Ac. N. Sc. 5, 168, ∗. Pearson, Can. Ent. 7, 216, ∗. Mead, Rep. Wheeler Exp. 5, 767.

Hab.—Colorado to California; New Mexico; Oregon; British America; Ontario.

186. **Marsyas**, Edw. Tr. A. E. Soc. 3, 16; id. But. N. A. 2, pl. 2 of Grapta.

Hab.—California.

187. **Hylas**, Edw. Tr. A. E. Soc. 4, 68; id. But. N. A. 2, pl. 2 of Grapta. Mead, l. c. 5, 768.

Hab.—Colorado.

188. **Rusticus**, Edw. Tr. A. E. Soc. 5, 107.

Hab.—California; Vancouver's Island.

189. **Faunus**, Edw. Pr. Ac. N. Sci. Ph. 1862, 222; id. But. N. A. 1, 97, pl. 35. Pearson, Can. Ent. 7, 49, ∗.

Hab.—Mountains of New England and New York; occasional West Virginia to Georgia; British America; Atlantic to Pacific.

190. **Silvius**, Edw. Tr. A. E. Soc. 5, 108.
Hab.—California.

191. **Zephyrus**, Edw. Tr. A. E. Soc. 3, 16; id. But. N. A. 1, 121, pl. 40. H. Edw. Pr. Cal. Ac. N. Sc. 5, 169, *. Mead, l. c. 5, 769.
Hab.—Montana to New Mexico; Utah; California; Oregon.

192. **Gracilis**, Gr.-Rob. Ann. N. Y. Lyc. N. Hist. 8, 432. Streck. pl. 8, fig. 14.
Hab.—New Hampshire, White Mountains; British America; Quebec; Alaska.

193. **Oreas**, Edw. Tr. A. E. Soc. 2, 373; id. 5, 109.
Hab.—California; Oregon.

194. **Silenus**, Edw. l. c. 3, 15; id. But. N. A. 2, pl. 1 of Grapta.
Hab.—Oregon; Vancouver's Island.

195. **Progne**, Cram.—Bd.-Lec. 188, pl. 50. Morr. 56. Harr. 301. Lintn. Pr. E. Soc. Phil. 3, 58, *.
C Argenteum, Kirby.
Hab.—Northern and Western States; British America; Canada; Nova Scotia; Anticosti.

196. **J Album**, Bd.—Bd.-Lec. 185, pl. 50. Morr. 56. Harr. 298. Lintn. Pr. E. Soc. Ph. 3, 58, *.
Hab.—Northern States; Wisconsin; British America to Pacific; Canada; Nova Scotia; South Labrador.

VANESSA, F.

197. **Antiopa**, L.—Bd.-Lec. 173. Morr. 57. Harr. 296, fig. 121, 122, *. Lintn. Pr. E. Soc. Ph. 3, 59, *. Saund. Can. Ent. 1, 75, *.
var. ——— Bunker, Can. Ent. 8, 240.
var. LINTNERII, Fitch, 3d. Rep. N. Y. St. Ag. Soc. No. 211. Morr. 57.
Hab.—United States; British America; Canada; Nova Scotia; South Labrador.

198. **Californica**, Bd. Ann. Soc. Ent. Fr. 2, 10, 306. Morr. 58. Behr, Pr. Cal. Ac. Sci. 4, 123, *. Mead, l. c. 5, 769. H. Edw. Pr. Cal. Ac. N. Sci. 5, 171, *.
Hab.—California; Oregon; Colorado.

199. **Milberti**, Godt.—Bd.-Lec. 187, pl. 50. Morr. 56. Harr. 302, fig. 125. Lintn. Pr. E. Soc. Ph. 3, 61, ∗. Saund. Can. Ent. 1, 76. ∗. Mead, l. c. 5, 769, ∗.

FURCILLATA, Say, 2, pl. 27.

Hab.—Northern States; Wisconsin; Colorado; Montana; California; British America; Canada; Nova Scotia.

PYRAMEIS, Doub.

200. **Atalanta**, L.—Bd.-Lec. 175. Morr. 58. Harr. 294, fig. 120, ∗.

Hab.—United States; British America; Canada; Nova Scotia; Anticosti.

201. **Huntera**, Drury.—Sm.-Abb. pl. 9, ∗. Bd.-Lec. 180, pl. 48, ∗. Morr. 60. Harr. 292, fig. 119, ∗. Lintn. Pr. E. Soc. Ph. 3, 63, ∗. Saund. Can. Ent. 1, 105, ∗.

Hab.—Northern United States; Kansas; British America; Canada; Nova Scotia; South Labrador.

202. **Cardui**, L.—Bd.-Lec. 178. Morr. 59. Saund. Can. Ent. 1, 93, ∗. Scud. Am. Nat. 10, 392, 602, ∗.

Hab.—United States, generally; British America; Canada.

203. **Carye**, Hüb. Samml. Ex. Schmett. 1. Behr, Pr. Cal. Ac. N. Sci. 4, 125, ∗. H. Edw. l. c. 5, 329, ∗.

Hab.—California; Arizona.

JUNONIA, Doub.

204. **Lavinia**, Cram.

var. ORYTHIA, Sm.-Abb. 1, pl. 8.

Cœnia, Hüb.—Bd.-Lec. 182, pl. 49, ∗. Morr. 61.

Lavinia, Harr. 293.

Hab.—Middle and Southern States to Pacific; occasional Massachusetts and Ontario.

ANARTIA, Doub.

205. **Jatrophæ**, L.—Cram. 3, pl. 202, fig. E. F. Morr. 62.

Hab.—Texas; Florida.

EUREMA, Bd.

206. **Lethe**, F. Ent. Syst. 3, 80.

Hab.—Texas, occasional; (coll. Belfrage).

EUNICA, Feld.

207. **Modesta**, Bates, Ent. Mo. Mag. 1, 113.

Hab.—Texas, occasional; (coll. Boll.).

208. ——— ?
Monima, Scud. (not Cramer).
Hyperipte, Edw. Synop. (not Hüb.).
Hab.—Florida, occasional; (coll. Edwards).

TIMETES, Bd.

209. **Coresia**, Godt. Enc. Meth. 9, 359.
Zerynthia, Hüb. Ex. Schmett. 2.
Hab.—Texas, occasional; (coll. Belfrage).

210. **Petreus**, Cram. 1, pl. 87, fig. D. E.
(*Eleucha*, Edw. Synop.).
Hab.—Florida, occasional; (coll. Chapman).

211. **Eleucha**, Doub. Gen. Di. Lep. pl. 33.
Hab.—Texas, occasional; (coll. Belfrage).

212. **Chiron**, F.
Marius, Cram. 3, pl. 200, fig. D. E.
Hab.—Texas, occasional; (coll. Belfrage).

CALLICORE, Doub.

213. **Clymena**, Cram. 1, pl. 24, fig. E. F.
Hab.—Florida, occasional; (coll. Edwards).

LIMENITIS, F.

214. **Ursula**, F.—Sm.-Abb. pl. 10, ∗. Bd.-Lec. 199, pl. 53, ∗. Morr. 64.
Astyanax, F.
Ephestion, Stoll. Harr. 283, ∗.
Hab.—Atlantic States; Mississippi Valley; Kansas; Arizona; Canada.

215. **Proserpina**, Edw. Pr. E. Soc. Ph. 5, 148; id. But. N. A. 1, 125, pl. 41.
Hab.—New York, Catskill Mountains; New Hampshire, White Mountains; Canada; Nova Scotia.

216. **Arthemis**, Drury.—Say, 2, pl. 23. Bd.-Lec. 202, pl. 54. Morr. 65. Harr. 283, pl. 1, fig. 7. Lintn. Pr. E. Soc. Ph. 3, 62, ∗. Mead, Can. Ent. 7, 162, ∗.
Lamina, F.
Hab.—Northern United States; British America to Pacific; Canada; Nova Scotia.

217. **Weidemeyerii**, Edw. Pr. Ac. N. Sc. Ph. 1861, 162; id. But. N. A. 1, 127, pl. 42. Morr. 327. Mead, Rep. Wheeler Exp. 5, 770, pl. 38.
Hab.—Rocky Mountains; Montana to New Mexico; Utah; Arizona.

218. **Disippus**, Godt.—Bd.-Lec. 204, pl. 55, ∗. Morr. 65. Harr. 281, fig. 109. Lintn. Pr. E. Soc. Ph. 3, 63, ∗. Riley, 3rd. Mo. Ent. Rep. 153, ∗.
var. ——— Mead, Can. Ent. 4, 216.
Hab.—United States; Canada; Nova Scotia.

219. **Lorquini**, Bd. Ann. Soc. Ent. Fr. 2, 10, 301. Morr. 66. Edw. But. N. A. 1, 129, pl. 43. Mead, l. c. 5, pl. 38. H. Edw. Pr. Cal. Ac. N. Sci. 5, 171, ∗.
Hab.—California; Arizona.

HETEROCHROA, Bd.

220. **Californica**, Butler, Pr. Zool. Soc. Lond. 1865, 485. Mead, l. c. 5, pl. 38. H. Edw. Pr. Cal. Ac. N. Sci. 5, 171, ∗.
Eulalia, Bd.
Bredowii, Edw. But. N. A. 1, 131, pl. 44.
Hab.—California; Arizona.

APATURA, F.

221. **Celtis**, Bd.—Bd.-Lec. 210, pl. 57. Morr. 68. Edw. But. N. A. 2, pl. 1 of Apat.
Lycaon, Riley, 6th. Mo. Ent. Rep. 137, ∗.
Hab.—Virginia to Gulf of Mex.; Miss. Valley; Kansas; Texas.

222. **Leilia**, Edw. Tr. A. E. Soc. 5, 103; id. But. N. A. 2, pl. 1 of Apat. Mead, l. c. 5, 770.
Hab.—Arizona.

223. **Alicia**, Edw. But. N. A. 1, 133, pl. 45.
Hab.—Gulf States; Georgia to Texas.

224. **Clyton**, Bd.—Bd.-Lec. 208, pl. 56. Morr. 68.
Herse, Riley, 6th. Mo. Ent. Rep. 140, ∗.
dim. var. PROSERPINA, Scud. Tr. Ac. N. Sci. Chic. 1, 332. Edw. But. N. A. 2, pl. 2, of Apat.
dim. var. OCELLATA, Edw. l. c. pl. 2.
var. FLORA, Edw. l. c.
Hab.—New York to Gulf of Mexico; Mississippi Valley; Kan.

PAPHIA, West.

225. **Andria**, Scud. Syn. List, 248.
Glycerium, Edw. But. N. A. 1, 135, pl. 46, ✱. Riley, 2d. Mo. Ent. Rep. 125, ✱.
Hab.—Illinois to Kansas; Texas.

226. **Troglodyta**, F.
Astyanax, Cram. 4, 337, fig. A. B.
Hab.—Florida; (auct. Scud.).

SATYRINÆ.

NEONYMPHA, West.

227. **Eurytris**, F.
Eurythris, Bd.-Lec. pl. 51, ✱. Morr. 73. Harr. 306, fig. 129. Saund. Can. Ent. 2, 139, ✱.
Hab.—Atlantic States; Mississippi Valley; Canada.

228. **Sosybius**, F.—Bd.-Lec. pl. 63, ✱. Morr. 74.
Hab.—Middle and Southern States; Mississippi Valley.

229. **Rubricata**, Edw. Tr. A. E. Soc. 3, 212.
Hab —Texas.

230. **Areolatus**, Sm.-Abb. 1, pl. 13, ✱. Bd.-Lec. pl. 63, ✱. Morr. 74.
Hab.—Gulf States; occasional in New Jersey; (coll. Meyer).

231. **Gemma**, Hüb.—Bd.-Lec. pl. 62, ✱. Morr. 73.
Hab.—West Virginia to Gulf States.

232. **Henshawi**, Edw. Tr. A. E. Soc. 5, 205.
Hab.—Arizona.

233. **Canthus**, L.—Bd.-Lec. pl. 60. Morr. 74.
Boisduvalli, Harr. 305, fig. 128.
Hab.—Northern States; Ontario; Quebec.

COENONYMPHA, West.

234. **California**, West.-Hen. Gen. Di. Lep. 398, pl. 67.
Californius, Bd.
var. ERYNGII, H. Edw. Pr. Cal. Ac. N. Sci. v. 6, Dec. 1876.
var. GALACTINUS, Ann. Soc. Ent. Fr. 2, 10, 309. Morr. 80.
Hab.—California; Montana.

235. **Inornata**, Edw. Pr. Ac. N. Sc. Ph. 1861, 163. Morr. 328.
Hab.—Montana; British America, Lake Winnipeg.

236. **Ochracea,** Edw. l. c. 1861, 163. Morr. 328. Mead, Rep. Wheeler Exp. 5, 772.
Hab.—Rocky Mountains; Montana to Arizona; Kansas; British America, Lake Winnipeg.

237. **Ampelos,** Edw. Tr. A. E. Soc. 3, 213.
Hab.—Oregon; Montana.

238. **Kodiak,** Edw. l. c. 2, 375.
Hab.—Kodiak.

239. **Brenda,** Edw. l. c. 2, 375.
Hab.—California, Los Angelos.

240. **Pamphiloides,** Reak. Pr. E. Soc. Ph. 6, 146, ♂.
Hab.—California.

EREBIA, Dalm.

241. **Fasciata,** Butl. Cat. Satyr. B. Mus. 92, pl. 2, fig. 8.
Hab.—Boreal America.

242. **Discoidalis,** Kirby, Faun. Bor. Am. 4, 298, pl. 3, fig. 2, 3. Morr. 75.
Hab.—Boreal America.

243. **Vesagus,** West.-Hen. Gen. Di. Lep. 380, pl. 64, ♂.
Hab.—Rocky Mountains; (prob. B. Am.).

244. **Rossii,** Curtis, App. Ex. Ross. 67, pl. A.
Hab.—Boreal America.

245. **Mancinus,** West.-Hen. Gen. Di. Lep. 380, pl. 54, ♂.
Hab.—Rocky Mountains; British America; Alaska.

246. **Haydenii,** Edw. Rep. Hayden Exp. Monta. 1872, 467; id. Tr. A. E. Soc. 5, 19.
Hab.—Montana.

247. **Callias,** Edw. Tr. A. E. Soc. 3, 274.
Tyndarus, Esper.
var. *Callias,* Mead, Rep. Wheeler Exp. 5, 775.
Hab.—Colorado; Mexico.

248. **Epipsodea,** Butl. Cat. Satyr. Brit. Mus. 80, pl. 2. Mead, l. c. 5, 775.
Rhodia, Edw. Tr. A. E. Soc. 3, 273.
Hab.—Colorado; New Mexico.

DEBIS, West.

249. **Portlandia,** F.—Bd.-Lec. 226, pl. 58, ✱.
Andromacha, Hüb.—Say, 2, pl. 36. Morr. 78.
Hab.—Middle and Southern States; Mississippi Valley; Iowa; Montana.

GYROCHEILUS, Butl.

250. **Tritonia,** Edw. Tr. A. E. Soc. 5, 18.
Hab.—Arizona.

HIPPARCHIA, F.

251. **Ridingsii,** Edw. Pr. E. Soc. Ph. 4, 201. Streck. pl. 4, fig. 6, ♀. Mead, l. c. 5, 774.
Hab.—Colorado; Nevada; Montana.

SATYRUS, West.

252. **Pegala,** F.—Morr. 77. Edw. Pr. E. Soc. Ph. 6, 195.
Hab.—Gulf States.

253. **Alope,** F.—Bd.-Lec. 228, pl. 59, ✱. Morr. 76. Harr. 305, fig. 127. Edw. Pr. E. Soc. Ph. 6, 196–200.
Hab.—Atlantic States; Mississippi Valley; Ontario.

254. **Boopis,** Behr. Proc. Cal. Ac. N. Sc. 3, 164.
Hab.—California; Oregon; Montana.

255. **Nephele,** Kirby, Faun. Bor. Am. 4, 297. Morr. 76. Harr. 306, fig. 130. Edw. l. c. 6, 195.
Hab.—Northern States; Maine to Nebraska; British America; Canada.

256. **Wheeleri,** Edw. Tr. A. E. Soc. 4, 343; id. But. N. A. 2, pl. 1, of Satyr. Mead, l. c. 5, 773, pl. 39.
Hoffmanni, Streck. pl. 4, fig. 8, ♀; pl. 8, fig. 12, ♂.
Hab.—Utah; Southern California; Arizona, Apache.

257. **Gabbii,** Edw. Tr. A. E. Soc. 3, 193.
Hab.—Oregon.

258. **Phocus,** Edw. l. c. 5, 14.
Hab.—British Columbia; Montana.

259. **Ariane,** Bd. Ann. Soc. Ent. Fr. 2, 10, 307. Morr. 77.
Hab.—California.

260. **Meadii**, Edw. Tr. A. E. Soc. 4, 70. Mead, l. c. 5, 774.
Hab.—Colorado; Arizona.

261. **Silvestris**, Edw. Pr. Ac. N. Sc. Ph. 1861, 162.
Hab.—California; Nevada; Montana.

262. **Sthenele**, Bd. Ann. Soc. Ent. Fr. 2, 10, 308. Morr. 77. Streck. pl. 4, fig. 7, ♂.
Hab.—California.

263. **Oetus**, Bd. Lep. de la Cal. 63.
Hab.—California.

264. **Charon**, Edw. Tr. A. E. Soc. 4, 69. Mead, Rep. Wheeler Exp. 5, 773.
Hab.—Montana; Colorado; New Mexico.

CHIONOBAS, Bois.

265. **Gigas**, Butl. Cat. Satyr. Br. Mus. 161, pl. 2. Edw. But. N. A. 2, pl. 1, ♀, pl. 2, ♂, of Chionobas.
Hab.—Vancouver's Island.

266. **Iduna**, Edw. l. c. 2, pl. 1 of Chionobas.
Hab.—California.

267. **Californica**, Bd. Lep. de la Cal. 62. Edw. l. c. 2, pl. 2 of Chionobas.
Hab.—California.

268. **Nevadensis**, Feld. Reise Nov. 3, pl. 62, fig. 4, 5.
Hab.—California.

269. **Chryxus**, West.-Hen. Gen. Di. Lep. 383, pl. 64. Edw. Pr. E. Soc. Ph. 2, 82. Scud. id. 5, 5. Mead, l. c. 5, 777.
Taygete, Edw.
Calais, Scud.
Hab.—Rocky Mountains; California; Hudson's Bay.

270. **Uhleri**, Reak. Pr. E. Soc. Ph. 6, 143. Mead, l. c. 5, 776. Streck. pl. 4, fig. 5, ♂.
Hab.—Rocky Mountains; Colorado; Montana.

271. **Tarpeia**, Esper, Eur. Schmett. 1, pl. 83. Butl. Cat. Satyr. Brit. Mus. p. 161.
Nanna, Mén.
Hab.—Boreal America.

272. **Bore**, Esper, Eur. Schmett. 1, pl. 100. Scud. Pr. E. Soc. Ph. 5, 10.
Bootes, Hüb.
Tuygete, Geyer.
Hab.—Labrador; Newfoundland; Greenland.

273. **Jutta**, Hüb. Eur. Schmett. 1, fig. 614, 615. Scud. l. c. 5, 3.
Balder, Hüb.
Hab.—British America; Hudson's Bay; Quebec; Labrador.

274. **Semidea**, Say, 3, pl. 50. Harr. 304. fig. 126. Morr. 80. Scud. l. c. 5, 3; id. Geol. Rep. N. H. 1, 344. Mead, l. c. 5, 776.
Oeno, Bd. Icones, 195, pl. 39. Scud. l. c. 5, 13.
Also, Bd.
Crambis, Freyer.
Assimilis, Butl.
Hab.—Labrador; Boreal America; White Mountains of New Hampshire; Colorado; New Mexico.

275. **Subhyalina**, Curtis, App. Ross Exp. 68.
Hab.—Boreal America.

LIBYTHEINÆ.

LIBYTHEA, F.

276. **Bachmanni**, Kirtland, Sill. Jl. 2, 13, 336. Edw. But. N. A. 2, pl. 1 of Libythea, *.
Hab.—Atlantic States; Mississippi Valley; Kansas; Texas.

277. **Carinenta**, Cram. 2, 108, fig. E. F.
Hab.—New Mexico; Arizona.

ERYCINIDÆ.

ERYCININÆ.

LEMONIAS, West.

278. **Mormo**, Feld.—Morr. 104.
Dumeti, Behr.
Mormonia, Bd.
Hab.—California; Utah; Arizona; New Mexico.

279. **Cythera**, Edw. Tr. A. E. Soc. 4, 345. Mead, Rep. Wheeler Exp. 5, pl. 36.
Hab.—Arizona.

280. **Virgulti**, Behr. Pr. Cal. Ac. N. Sc. 3, 178.
Sonorensis, Feld.
Hab.—Southern California.

281. **Palmerii**, Edw. Tr. A. E. Soc. 3, 195.
Hab.—Arizona.

CHARIS, West.

282. **Cænius**, L.
Pumila, Bd.-Lec. 131, pl. 37. Morr. 104.
Hab.—Southern States.

283. **Borealis**, Gr.-Rob. Ann. N. Y. Lyc. N. Hist. 8, 351.
Hab.—Middle States; Illinois.

284. **Nemesis**, Edw. Tr. A. E. Soc. 3, 212.
Hab.—Arizona.

EUMENIA, Latr.

285. **Atala**, Poey, Cent. Lep. Cuba, pl. 2.
Torea, Gray.
Hab.—Florida.

LYCÆNIDÆ.

THECLINÆ.

THECLA, F.

Group I.

286. **Grunus**, Bd. Ann. Soc. Ent. Fr. 2, 10, 289; id. Lep. de la Cal. 43. Morr. 100.
Hab.—California, Yosemite.

Group II.

287. **Crysalus**, Edw. Tr. A. E. Soc. 4, 344.
Hab.—Colorado; Utah.

288. **Halesus**, Cram.—Bd.-Lec. 83, pl. 25, *. Morr. 91.
Dolichos, Hüb.
Juanita, Scud.
Hab.—Gulf States; California.

289. **M-Album**, Bd.-Lec. 86, pl. 26, *. Morr. 92.
Psyche, Bd.-Lec. 88, pl. 27.
Hab.—Gulf States; occasional in Virginia and Pennsylvania.

Group III.

290. **Favonius**, Sm.-Abb. 1, pl. 14, ∗.
Hab.—Gulf States; South Carolina.

291. **Autolycus**, Edw. Tr. A. E. Soc. 3, 271.
Hab.—Texas; Missouri.

292. **Alcestis**, Edw. l. c. 3, 271.
Hab.—Texas.

293. **Humuli**, Harr. 276, pl. 4, fig. 3.
Favonius, Bd.-Lec. 95, pl. 30, ∗. Morr. 95.
var. *Hyperici*, Bd.-Lec. 90, pl. 28.
Hab.—Middle and Southern States; Mississippi Valley.

294. **Melinus**, Hüb. Zutraeg. fig. 121, 122. Bd. Ann. Soc. Ent. Fr. 2, 10, 287.
var. PUDICA, H. Edw. Trans. Cal. Ac. Sc. 6, Dec. 1876.
Hab.—California.

295. **Acis**, Drury, 1, pl. 1. Morr. 101.
Hab.—Florida, Key West.

296. **Strigosa**, Harr. 276. Edw. But. N. A. 1, 144, pl. 48. Saund. Can. Ent. 1, 99, ∗.
Liparops, Scud. (nec. Bd.-Lec.).
Hab.—Atlantic States; Mississippi Valley; Canada.

297. **Ontario**, Edw. Tr. A. E. Soc. 2, 209; id. But. N. A. 1, 143, pl. 48.
Hab.—Ontario; New England, (auct. Scud.).

298. **Calanus**, Hüb.
Falacer, Bd.-Lec. 92, pl. 29, ∗. Morr. 95.
Inorata, Gr.-Rob. Saund. Can. Ent. 1, 57, ∗.
Lorata, Gr.-Rob.
Hab.—Atlantic States; Mississippi Valley; Texas; New Mexico; Canada.

299. **Edwardsii**, Saund. in Gr.-Rob. Tr. A. E. Soc. 1, 172.
Falacer, Harr.
Calanus, Gr.-Rob.
Hab.—Northern States, Maine to Nebraska; Colorado; Canada.

300. **Acadica**, Edw. Pr. Ac. N. Sc. Ph. 1862, 55; id. But. N. A. 1, 140, pl. 48. Saund. Can. Ent. 1, 95, ∗.
Souhegan, Whitney.
Hab.—Northern States; Canada.

301. **Californica**, Edw. l. c. 1862, 223.
var. CYGNUS, Edw. Tr. A. E. Soc. 3, 207.
Borus, Bd.
Hab.—California; Oregon; Vancouver's Island.

302. **Auretorum**, Bd. Ann. Soc. Ent. Fr. 2, 10, 288. Morr. 99.
Hab.—California.

303. **Sylvinus**, Bd. l. c. 2, 10, 287. Morr. 99.
Hab.—California.

304. **Dryope**, Edw. Tr. A. E. Soc. 3, 19, 193.
Hab.—California.

305. **Putnami**, H. Edw. Pr. Cal. Ac. N. Sci. 6, Sept. 1876.
Hab.—Utah, Spring Lake.

306. **Adenostomatis**, H. Edw. l. c. 6, Sept. 1876.
Hab.—Southern California, Tehachipi Pass.

307. **Spadix**, H. Edw. l. c. 6, Dec. 1876.
Hab.—California.

308. **Tetra**, Behr. in Edw. Tr. A. E. Soc. 3, 19.
Hab.—California.

309. **Chalcis**, Behr. in lit. Edw. l. c. 2, 376.
Hab.—California.

310. **Sæpium**, Bd. Ann. Soc. Ent. Fr. 2, 10, 288. Morr. 99.
Hab.—California; Utah; Colorado.

311. **Nelsoni**, Bd. Lep. de la Cal. 43.
Hab.—California, Yosemite.

312. **Ninus**, Edw. Tr. A. E. Soc. 3, 270.
Hab.—Colorado.

313. **Spinetorum**, Bd. in Hew. Illust. Part 3, fig. 198, 199. Bd. Lep. de la Cal. 42.
Hab.—California, Mount Shasta and Placer County.

314. **Siva**, Edw. Tr. A. E. Soc. 5, 110.
Hab.—Arizona.

315. **Smilacis**, Bd.—Bd.-Lec. 107, pl. 33, ✱. Morr. 98.
Auburniana, Harr. 277.
Hab.—Atlantic States; Mississippi Valley; Texas.

316. **Castalis**, Edw. Tr. A. E. Soc. 3, 208.
Hab.—Texas.

317. **Pocas**, Hüb.—Bd.-Lec. 111, pl. 35. Morr. 103.
Hab.—Southern States; West Virginia; Kentucky.

318. **Columella**, F.
Eurytulus, Hüb. Samml. Exot. Schmett. 2.
Modesta, Maynard, Am. Nat. 7, 178.
Ocellifera, Gr.
Hab.—Florida; Texas; occasional in Western New York, (coll. Grote).

Group IV.

319. **Behrii**, Edw. Tr. A. E. Soc. 3, 18.
Hab.—California; Nevada.

320. **Augustus**, Kirby, Faun. Bor. Am. 4, 298, pl. 3, fig. 4, 5. Harr. 279, fig. 108. Morr. 103.
Hab.—Boreal America; Canada; Eastern States.

321. **Iroides**, Bd. Ann. Soc. Ent. Fr. 2, 10, 289. Morr. 100.
Hab.—Oregon; British Columbia.

322. **Irus**, Godt.—Bd.-Lec. 101, pl. 31. Morr. 97.
var. *Arsace*, Bd.-Lec. 103, pl. 32.
var. Henrici, Gr.-Rob. Tr. A. E. Soc. 1, 174.
Hab.—Atlantic States; Mississippi Valley; Kansas; Vancouver's Island.

323. **Eryphon**, Bd. l. c. 2, 10, 290. Morr. 100.
Hab.—California.

324. **Niphon**, Hüb.—Bd.-Lec. 105, pl. 33. Morr. 98.
Hab.—Atlantic States; Mississippi Valley; Colorado; Canada; Nova Scotia.

325. **Affinis**, Edw. Pr. Ac. N. Sc. Ph. 1862, 223.
Hab.—Utah.

326. **Dumetorum**, Bd. Ann. Soc. Ent. Fr. 2, 10, 291. Morr. 100.
Viridis, Edw. l. c. 223.
Hab.—California; Nevada; Oregon.

327. **Læta**, Edw. l. c. 1862, 55; id. But. N. A. 1, 139, pl. 48.
Clothilde, Edw.
Hab.—Maine to West Virginia; Ontario; Quebec.

328. **Fuliginosa**, Edw. l. c. 1861, 164.
Suasa, Bd.
Hab.—California, Lake Tahoe.

329. **Titus**, F.
Mopsus, Hüb.—Bd.-Lec. 109, pl. 34, ✱. Morr. 102. Saund. Can. Ent. 1, 96, ✱.
Hab.—United States generally; British America; Ontario; Quebec.

LYCAENINÆ.

FENISECA, Grote.

330. **Tarquinius**, F.
Crataegi, Bd.-Lec. 128, pl. 37. Morr. 85.
Porsenna, Scud.
Hab.—Atlantic States; Mississippi Valley; Ontario Quebec; Nova Scotia.

CHRYSOPHANUS, Doub.

Group I.

331. **Arota**, Bd. Ann. Soc. Ent. Fr. 2, 10, 293. Morr. 86. Streck. pl. 10, fig. 27, 28.
Hab.—California.

332. **Virginiensis**, Edw. Tr. A. E. Soc. 3, 21.
Hab.—California; Nevada.

333. **Hermes**, Edw. l. c. 3, 21.
Hab.—California; Nevada.

Group II.

334. **Xanthoides**, Bd. Ann. Soc. Ent. Fr. 2, 10, 292; id. Lep. de la Cal. 45. Morr. 86. Streck. pl. 10, fig. 12, 13.
Hab.—California.

335. **Dione**, Scud. Tr. Chic. Ac. Sci. 1, 330.
Hab.—Iowa; Nebraska; Missouri; Kansas.

336. **Gorgon**, Bd. l. c. 2, 10, 292. Morr. 86. Streck. pl. 10, fig. 17.
Hab.—California.

337. **Thoe**, Bd.-Lec. 125, pl. 38. Morr. 84. Saund. Can. Ent. 1, 57, ∗.

Hyllus, Edw. Synop. nec Cram.

Hab.—Northern United States; Maine to Nebraska; Kansas; Canada.

338. **Nais**, Edw. Tr. A. E. Soc. 5, 291.

Hab.—Arizona.

Group III.

339. **Mariposa**, Reak. Pr. E. Soc. Ph. 6, 149. Streck. pl. 10, fig. 25, 26.

Nivalis, Bd.

Hab.—California.

340. **Zeroe**, Bd. Lep. de la Cal. 45.

Ianthe, Edw. Tr. A. E. Soc. 3, 211. Streck. pl. 10, fig. 23, 24.

Hab.—California; Colorado.

341. **Helloides**, Bd. Ann. Soc. Ent. Fr. 2, 10, 291. Morr. 86. Streck. pl. 10, fig. 19, 20. Mead, Rep. Wheeler Exp. 5, 780, ∗.

Castro, Reak.

Hab.—Montana to Arizona; California; Oregon.

342. **Dorcas**, Kirby, Faun. Bor. Am. 4, 299, pl. 4. Morr. 90.

Hab.—British America; Southern Labrador.

343. **Epixanthe**, Bd.-Lec. 127, pl. 38. Morr. 85. Saund. Can. Ent. 1, 57.

Hab.—Northern United States; Kansas; British America; Canada.

344. **Americana**, D'Urban, Can. Nat. 5, 246. Harr. 273, fig. 104, ∗. Saund. Can. Ent. 1, 3, ∗.

Phlæas, Bd.-Lec. 123. Morr. 84.

Hypophlæas, Bd.

Hab.—Northern States; West Virginia; Kentucky; California, (auct. Boisduval); British America, Columbia to Canada; Nova Scotia.

Group IV.

345. **Cupreus**, Edw. Tr. A. E. Soc. 3, 20; id. But. N. A. 2, pl. 1 of Chrys.

Hab.—Oregon; California; Sierras.

346. **Rubidus**, Behr. Pr. E. Soc. Ph. 6, 208. Edw. But. N. A. 2, pl. 1 of Chrys.

Hab.—Oregon; Montana; Nevada.

347. **Sirius**, Edw. l. c. 3, 270; id. But. N. A. 2, pl. 1 of Chrys. Mead, l. c. 5, 781.

Hab.—Montana; Colorado; Arizona.

LYCAENA, Fab.

Group I.

348. **Heteronea**, Bd. Ann. Soc. Ent. Fr. 2, 10, 298. Morr. 89. Edw. But. N. A. 2, pl. 1 of Lyc. Streck. pl. 10, fig. 6, ♂, 7, ♀. Mead, l. c. 5, 781.

Hab.—California; Utah; Colorado.

349. **Clara**, H. Edw. Pr. Cal. Ac. N. Sc. 6, Feb. 1877.

Hab.—California, Los Angelos.

350. **Speciosa**, H. Edw. l. c. v. 6, Dec. 1876.

Hab.—California, Kern County.

351. **Lycea**, Edw. Pr. E. Soc. Ph. 2, 507. Mead, l. c. 5, 785, ✳.
Rapahoe, Reak.—Streck, pl. 10, fig. 14, ♂, 15, ♀.

Hab.—Montana; Colorado; Arizona.

352. **Amica**, Edw. l. c. 2, 80.

Hab.—British America, Mackenzie's River.

353. **Sagitifera**, Feld. Reise Nov. 2, 281, pl. 35.
Catalina, Reak. Pr. Ac. N. Sc. Ph. 1866, 244. Streck. pl. 10, fig. 1, ♂, 2, ♀.
Lorquini, Behr, Pr. Cal. Ac. N. Sc. 3, 280.
Daunia, Edw. Mead, l. c. 5, 785.
var. *Viaca*, Edw. Tr. A. E. Soc. 3, 209.
Rhæa, Bd.

Hab.—Colorado; California.

354. **Icaroides**, Bd. Ann. Soc. Ent. Fr. 2, 10, 297. Morr. 88.
Dædalus, Behr, Pr. Cal. Ac. N. Sc. 3, 280.
var. *Pardalis*, Behr, l. c. 3, 280.
Mintha, Edw. Tr. A. E. Soc. 3, 194.
Maricopa, Reak.
Erymus, Bd.
Hab.—California. A species subject to much variation.

355. **Fulla**, Edw. Tr. A. E. Soc. 3, 194.
Hab.—California, Sierras.

356. **Pembina**, Edw. Pr. Ac. N. Sc. Ph. 1862, 224.
Hab.—British America, Slave Lake.

357. **Pheres**, Bd. Ann. Soc. Ent. Fr. 2, 10, 297. Morr. 89.
var. *Evius*, Bd. lep de la Cal. 49.
Hab.—California to Colorado; Oregon; British Columbia; Vancouver's Island.

358. **Phileros**, Bd. Lep. de la Cal. 50.
Helios, Edw. Tr. A. E. Soc. 3, 208.
Hab.—California; Utah; Arizona.

359. **Ardea**, Edw. Tr. A. E. Soc. 3, 209.
Hab.—California.

360. **Kodiak**, Edw. l. c. 3, 20.
Hab.—Kodiak.

361. **Orcus**, Edw. l. c. 3, 276.
Hab.—California.

362. **Sæpiolus**, Bd. Ann. Soc. Ent. Fr. 2, 10, 296. Morr. 88. Mead, l. c. 5, 784, ✱.
dim. var. ♀ AEHAJA, Behr, Pr. Cal. Ac. N. Sci. 3, 280.
Rufescens, Bd. Mead, l. c. 5, 784.
Hab.—California to Colorado.

Group II.

363. **Xerxes**, Bd. l. c. 2, 10, 296. Morr. 88.
Hab.—California.

364. **Antiacis,** Bd. l. c. 2, 10, 300. Morr. 90.
var. *Behrii*, Edw. Pr. Ac. N. Sc. Ph. 1862, 224.
Polyphemus, Bd.
var. *Mertila*, Edw. Pr. E. Soc. Ph. 6, 206.
Hab.—California; Arizona.

365. **Couperi,** Grote, Bul. Buf. Soc. N. Sc. 1, 185.
Pembina, Streck. pl. 10, fig. 10, ♂, 11, ♀.
Hab.—Anticosti; Southern Labrador.

366. **Lygdamas,** Doub. Entomologist, 1842, 209. Edw. But. N. A. 1, 148, pl. 49. Mead, l. c. 5, 784.
var. ORO, Scud. Can. Ent. 8, 23.
Hab.—Atlantic States; Michigan; Ohio; Colorado.

367. **Sonorensis,** Feld. Reise Nov. 2, 281, pl. 35, fig. 3, 4.
Regia, Bd. Lep. de la Cal. 46. Edw. But. N. A. 2, pl. 1 of Lyc.
Hab.—Southern California, Los Angelos.

Group III.

368. **Tehama,** Reak. Pr. Ac. N. Sc. Ph. 1866, 246.
Cilla, Behr, Pr. Cal. Ac. N. Sc. 3, 281.
Nestos, Bd.
Hab.—California.

369. **Orbitulus,** Von Prunner. Streck. pl. 10. fig. 16, ♂.
Rustica, Edw. Pr. E. Soc. Ph. 4, 203. Mead, l. c. 5, 783.
Hab.—Colorado; Rocky Mountains.

370. **Aquilo,** Bd. Icones, 1, 62, pl. 12, fig. 7, 8.
Franklinii, Curtis, App. Ross Exp. 69, pl. A, fig. 8, 9.
Hab.—Boreal America; Labrador.

Group IV.

371. **Enoptes,** Bd. Ann. Soc. Ent. Fr. 2, 10, 298. Morr. 89.
Hab.—California, Sierras; Arizona.

372. **Glaucon,** Edw. Tr. A. E. Soc. 3, 210. Mead, l. c. 5, 782.
Hab.—Colorado.

373. **Battoides,** Behr, Pr. Cal. Ac. N. Sc. 3, 282. Mead, l. c. 5, 782.
Hab.—California, Sierras; Nevada; Colorado.

374. **Lupini,** Bd. Lep. de la Cal. pl. 46.
Minehaha, Scud.
Hab.—California, Yosemite; Montana.

375. **Melissa**, Edw. Tr. A. E. Soc. 4, 346. Streck. pl. 10, fig. 8, ♂, 9, ♀. Mead, l. c. 5, 783, pl. 36.
Hab.—Arizona; New Mexico; Colorado; Montana; Nevada.

376. **Scudderii**, Edw. Pr. Ac. N. Sc. Ph. 1861, 164; id. l. c. 1862, 225.
Hab.—New York; Michigan; California; British Columbia; Ontario; Southern Labrador.

377. **Acmon**, West.-Hew. Gen. Di. Lep. pl. 76. Mead, l. c. 5, 782.
Antiegon, Bd. Morr. 87.
Hab.—California; Arizona; Colorado.

378. **Anna**, Edw. Pr. Ac. N. Sc. Ph. 1861, 163. Streck. pl. 10, fig. 4, ♂, 5, ♀.
Cajona, Reak.
Argyrotoxus, Behr, Pr. Cal. Ac. N. Sc. 3, 281.
Philemon, Bd.
Hab.—California to Colorado; Montana; Oregon.

379. **Piasus**, Bd. Ann. Soc. Ent. Fr. 2, 10, 299. Morr. 89.
Echo, Edw. Pr. E. Soc. Ph. 2, 506.
Hab.—California; Arizona; Colorado.

380. **Pseudargiolus**, Bd.-Lec.
dim. var. VIOLACEA, Edw. Pr. E. Soc. Ph. 6, 201; id. But. N. A. 1, 147, pl. 49.
dim. var. PSEUDARGIOLUS, Bd.-Lec. 118, pl. 36. Edw. l. c. 1, 151, pl. 50; id. Can. Ent. 7, 81, *.
Argiolus, Sm.-Abb.
Hab.—Middle, Southern and Western States.

381. **Neglecta**, Edw. Pr. Ac. N. Sci. Ph. 1862, 56; id. But. N. A. 1, 153, pl. 50. Saund. Can. Ent. 1, 100, *.
Hab.—Northern and Middle States; British America; Canada.

382. **Lucia**, Kirby, Faun Bor. Am. 4, 299, pl. 3, fig. 8, 9. Harr. 275.
Hab.—Northern States; British America; Canada; Southern Labrador.

Group V.

383. **Amyntula**, Bd. Ann. Soc. Ent. Fr. 2, 10, 294. Morr. 87.
Hab.—California; Arizona.

384. **Comyntas**, Godt.—Bd.-Lec. 120, pl. 36. Morr. 83. Harr. 275, ∗. Edw. Can. Ent. 8, 202, ∗.
Hab.—Atlantic States; Mississippi Valley; Rocky Mountains; British America; Canada.

385. **Shasta**, Edw. Pr. Ac. N. Sci. Ph. 1862, 224.
Calchas, Behr, Pr. Cal. Ac. N. Sc. 3, 281.
Nivium, Bd.
Hab.—California; Oregon; Nevada; Utah.

386. **Monica**, Reak. Pr. Ac. N. Sci. Ph. 1866, 244. Streck. pl. 10, fig. 18.
Hab.—Southern California; Arizona.

387. **Alce**, Edw. Tr. A. E. Soc. 3, 272.
Isola, Mead, (not Reakirt), Rep. Wheeler Exp. 5, 783.
Hab.—Colorado; Arizona; Texas; occasional in Kansas; (coll. Snow.).

388. **Gyas**, Edw. l. c. 3, 210.
Hab.—Arizona.

389. **Filenus**, Poey, Cent. Lep. Cuba, pl. 2. Bd.-Lec. 114, pl. 35. Morr. 82.
Hab.—Gulf States.

390. **Isophthalma**, Herr.-Schaeff.
Pseudofea, Morrison, Bul. Buf. Soc. N. Sc. 1, 186.
Hab.—Florida; Georgia.

391. **Ammon**, Lef.-De. Sag. Hist. N. Cuba, 612, pl. 16.
Hab.—Florida Keys.

392. **Fea**, Edw. Tr. A. E. Soc. 3, 211.
Hab.—Texas.

393. **Exilis**, Bd. Ann. Soc. Ent. Fr. 2, 10, 294. Morr. 87.
Hab.—California; Arizona.

394. **Marina**, Reak. Pr. Ac. N. Sc. Ph. 1868, 87.
Hab.—Southern California, Los Angelos; (coll. Russell).

395. **Theonus**, Lef.-De. Sag. Hist. N. Cuba, 611, pl. 16.
Cassius, Morrison, Bul. Buf. Soc. N. Sc. 1, 187.
Hab.—Florida Keys.

HESPERIDÆ.

SECTION I.

CARTEROCEPHALUS, Led.

396. **Mandan**, Edw. Pr. E. Soc. Ph. 2, 20, pl. 5.

Mesapano, Scud. Pr. Bost. Soc. N. Hist. 11, 383.

Skada, Edw.

Hab.—British America, Pacific to Labrador; California, Mendocino; New Hampshire, White Mountains.

397. **Omaha**, Edw. l. c. 2, 21.

Mingo, Edw.

Californica, Scud. Syst. Rev. 54.

Hab.—Colorado; California; occasional in West Virginia, (coll. J. E. Meyer).

ANCYLOXYPHA, Feld.

398. **Numitor**, F.—Morr. 120.

Puer, Hüb.

Marginatus, Harr. 308, fig. 131.

Hab.—Atlantic and Western States; Texas; Kansas; Nebraska.

COPÆODES, Speyer.

399. **Procris**, Edw. Tr. A. E. Soc. 3, 215, ♂, ♀.

var. *Waco*, Edw. l. c. 2, 122, ♂.

Minima, Edw. l. c. 196, ♂.

Hab.—Texas.

400. **Arene**, Edw. l. c. 3, 214.

Hab.—Arizona; Texas.

THYMELICUS, Speyer.

401. **Hylax**, Edw. l. c. 3, 274.

Hab.—Colorado; Dakota.

402. **Garita**, Reak. Pr. E. Soc. Ph. 6, 150.

Powescheik, Parker, Am. Ent. 2, 271.

Hab.—Colorado; Illinois; Iowa; Nebraska.

PAMPHILA, F.

Group I.

403. **Massasoit**, Scud. Pr. Ess. Ins. 3, 171.
Hab.—New England; Long Island; Middle States; Texas; Colorado.

404. **Zabulon**, Bd.-Lec. pl. 76. Morr. 116.
Hobomok, Harr. 313, fig. 137.
Quadriquina, Scud.
dim. var. ♀, POCAHONTAS, Scud. Pr. Ess. Ins. 3, 171.
Hab.—Atlantic States; Mississippi Valley; Texas; Arizona; Canada.

Group II.

405. **Sylvanus**, F.—Bd. Ann. Soc. Ent. Fr. 2, 10, 313.
Hab.—Europe; California, (auct. Boisduval).

406. **Sylvanoides**, Bd. l. c. 2, 10, 313. Morr. 107.
Sonora, Scud. Syst. Rev. 57.
Hab.—California.

407. **Ruricola**, Bd. l. c. 2, 10, 315, ♂. Morr. 109.
Hab.—California.

408. **Comma**, L.—Esp. Eur. Schmett. 1, pl. 23. Hüb Eur. Schmett. 1, fig. 479—481. Bd. Ann. Soc. Ent. Fr. 2, 10, 313.
var. —— Scud. Mem. Bost. Soc. N. H. 2, 350, pl. 10, fig. 12—15.
Juba, Scud. l. c. 2, 349, pl. 10, fig. 19, 20.
Manitoba, Scud. l. c. 351, fig. 8—11.
var. COLORADO, Scud. l. c. 349, fig. 16—18.
Nevada, Scud. l. c. 347, fig. 1—4.
Sylvanoides, Scud. (nec Bd.) l. c. 351, fig. 21, 22.
Hab.—British America, Pacific to Labrador; Rocky Mountains; Montana to Arizona; Colorado to California.

409. **Sassacus**, Scud. Pr. Ess. Ins. 3, 173; id. Mem. Bost. Soc. N. Hist. 2, 346, pl. 10, fig. 5. 7.
Hab.—New England; Illinois; Georgia.

410. **Pawnee**, Dodge, Can. Ent. 6, 44.
Hab.—Nebraska.

411. **Ottoe**, Edw. Pr. E. Soc. Ph. 6, 207. Scud. Mem. Bost. Soc. N. Hist. 2, 348, pl. 10, fig. 6.
Hab.—Indian Territory; Kansas; Nebraska.

412. **Napa**, Edw. l. c. 4, 202, pl. 1.
Dacotah, Edw.
Ridingsii, Reak. Pr. E. Soc. Ph. 6, 151, ♀.
dim. var. ♀, MELANE, Edw. Tr. A. E. Soc. 2, 312.
Hab.—Colorado.

413. **Draco**, Edw. l. c. 3, 274.
Hab.—Colorado.

414. **Metea**, Scud. Proc. Ess. Ins. 3, 177.
Hab.—Connecticut; New York; Texas.

415. **Uncas**, Edw. Pr. E. Soc. Ph. 2, 19, pl. 5.
Hab.—Pennsylvania; Delaware; Ohio; Kansas; Dakota; Colorado; New Mexico; British America.

416. **Licinus**, Edw. Tr. A. E. Soc. 3, 275.
Hab.—Texas.

417. **Seminole**, Scud. Syst. Rev. 55.
Hab.—Florida.

418. **Attalus**, Edw. l. c. 3, 276.
Hab.—Texas.

419. **Yuma**, Edw. Tr. A. E. Soc. 4, 346.
Hab.—Arizona.

420. **Meskei**, Edw. Can. Ent. 9, March, 1877, ♀.
Hab.—Texas.

421. **Snowi**, Edw. Can. Ent. 9, Feby. 1877.
Hab.—Colorado.

422. **Leonardus**, Harr. 314, fig. 138. Morr. 110.
Hab.—New England to West Virginia; Kansas.

423. **Nemorum**, Bd. Ann. Soc. Ent. Fr. 2, 10, 314. Morr. 107.
Yreka, Edw. Pr. E. Soc. Ph. 6, 207.
Hab.—California.

424. **Agricola**, Bd. l. c. 2, 10, 314. Morr. 108.
Hab.—California.

425. **Pratincola**, Bd. l. c. 2, 10, 315, ♂. Morr. 108.
Hab.—California.

426. **Campestris**, Bd. l. c. 2, 10, 316, ♂. Morr. 108.
Hab.—California.

427. **Huron**, Edw. Pr. E. Soc. Ph. 2, 16, pl. 1.
Hab.—Atlantic States; Mississippi Valley; Texas; Kansas; Arizona.

428. **Phylæus**, Drury.—Bd.-Lec. pl. 78. Morr. 118.
Vitellius, F.
Bucephalus, Humph.-West. Br. But. 126, pl. 40, fig. 1—3.
Hab.—Middle and Gulf States to Pacific.

429. **Brettus**, Bd.-Lec. pl. 75, ♂. Morr. 118.
Wingina, Scud. Pr. Ess. Ins. 3, 173, ♂ ♀.
Orono, Scud. Syst. Rev. 58.
Hab.—Gulf States; West Virginia.

430. **Pontiac**, Edw. Pr. E. Soc. Ph. 2, 17, pl. 11, ♂.
Conspicua, Edw. l. c. 2, 17, pl. 5, ♀. Parker, Can. Ent. 3, 51, ♂.
Hab.—Michigan; Iowa; Nebraska; Illinois.

431. **Chusca**, Edw. Tr. A. E. Soc. 4, 346.
Hab.—Arizona.

432. **Sabuleti**, Bd. Ann. Soc. Ent. Fr. 2, 10, 316. Morr. 109.
Hab.—California.

433. **Otho**, Sm.-Abb. pl. 16.
Hab.—Gulf States.

var. EGEREMET, Scud. Pr. Ess. Ins. 3, 174.
Otho, Bd.-Lec. pl. 77, ✱.
Ætna, Scud. Syst. Rev. 58.
Hab.—Atlantic States to Florida; Mississippi Valley; Canada.

434. **Peckius**, Kirby, Faun. Bor. Am. 4, 300, pl. 4. Morr. 120.
Wamsutta, Harr. 318, fig. 141.

Hab.—Northern and Middle States to Wisconsin; Kansas; Canada.

435. **Mystic**, Edw. Pr. E. Soc. Ph. 2, 15, pl. 1. Scud. Pr. Ess. Ins. 3, 172.

Hab.—New England; New York, Catskill Mountains; Canada.

436. **Cernes**,* Bd.-Lec. pl. 76.
Arogos, id. l. c. pl. 76.
Ahaton, Harr. 317, fig. 140.
Origines, Morr. 117.

Hab.—New England; Middle and Northwestern States; California.

437. **Manataaqua**, Scud. Pr. Ess Ins. 3, 175.
Cernes, Harr. 316.

Hab.—Atlantic to Pacific; Canada to Gulf of Mexico.

438. **Vestris**, Bd. Ann. Soc. Ent. Fr. 317, ♂. Morr. 109.

Hab.—California.

439. **Osceola**, Lintn. 28th. Rep. N. Y. State Mus.

Hab.—California, Mendocino.

440. **Metacomet**, Harr. 317.
Rurea, Edw. Pr. Ac. N. Sc. Ph. 1862, 58.
var. *Kiowah*, Reak. Pr. E. Soc. Ph. 6, 150.

Hab.—Northern States; Wisconsin; Kansas; Canada.

441. **Accius**, Sm.-Abb. pl. 23, ♀.
Monoco, Scud. Pr. Ess. Ins. 3, 178.
var. *Nortonii*, Edw. Tr. A. E. Soc. 1, 287.
Punctella, Gr.-Rob. l. c. 1, 1.

Hab.—Gulf States.

442. **Deva**, Edw. Tr. A. E. Soc. 5, 292.

Hab.—Arizona.

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* The Fabrician name *Taumas* for *Cernes* cannot be retained from its collision with the older *Thaumas*, Hufnagel.—S.

443. **Maculata,** Edw. Pr. E. Soc. Ph. 4, 202, pl. 1.
Hab.—Gulf States; occasional in New York, (coll. Meske).

444. **Panoquin,** Scud. Pr. Ess. Ins. 3, 178.
Ophis, Edw. Tr. A. E. Soc. 216.
Hab.—Gulf States.

445. **Ocola,** Edw. Pr. E. Soc. Ph. 2, 20, pl. 11.
Hab.—Gulf States.

446. **Ethlius,** Cram. 4, pl. 392, fig. A, B.
Chemnis, F.
Olynthus, Bd.-Lec. pl. 75. Morr. 113.
Hab.—Gulf States.

447. **Verna,** Edw. Pr. Ac. N. Sc. Ph. 1862, 57.
Hab.—Maryland to Georgia; West Virginia; Kansas.

448. **Horus,** Edw. Tr. A. E. Soc. 3, 277.
Hab —Texas.

449. **Bimacula,** Gr.-Rob. Ann. N. Y. Lyc. N. Hist. 8, 433.
Acanootus, Scud. Pr. Bost. Soc. N. Hist. 11, 381.
Illinois, Dodge, Can. Ent. 4, 217.
Hab.—Massachusetts to Nebraska; Illinois.

450. **Arpa,** Bd.-Lec. pl. 68, ∗. Morr. 117.
Hab.—Gulf States; Nebraska, (coll. Dodge).

451. **Bulenta,** Bd.-Lec. pl. 67, ∗. Morr. 117.
Palatka, Edw. Tr. A. E. Soc. 1, 287.
Hab.—Gulf States.

452. **Viator,** Edw. Pr. E. Soc. Ph. 4, 202, pl. 1.
Hab.—Gulf States; Illinois; Wisconsin; New Jersey.

453. **Vitellius,** Sm.-Abb. pl. 17.
Iowa, Scud. Pr. Bost. Soc. N. Hist. 11, 6.
Hab.—Georgia; Iowa; Nebraska.

454. **Delaware,** Edw. Pr. E. Soc. Ph. 2, 19, pl. 5, ♂.
Logan, Edw. l. c. 2, 18, pl. 1, ♀.
Hab.—Pennsylvania to Florida; West Virginia; Illinois to Kansas; Nebraska; Dakota.

455. **Osyka**, Edw. Tr. A. E. Soc. 1, 288.
Hab.—Gulf States.

456. **Comus**, Edw. Tr. A. E. Soc. 5, 206.
Hab.—Texas.

457. **Eufala**, Edw. l. c. 2, 311.
Hab.—Louisiana; Texas.

458. **Fusca**, Gr.-Rob. l. c. 1, 2.
Hab.—Gulf States.

459. **Nereus**, Edw. l. c. 5, 207.
Hab.—Arizona.

460. **Hianna**, Scud. Pr. Bost. Soc. N. Hist. 11, 382.
Hab.—Massachusetts to Nebraska.

AMBLYSCIRTES, Speyer.

461. **Vialis**, Edw. Pr. Ac. N. Sci. Ph. 1862, 58.
Hab.—Middle, Southern and Western States.

462. **Eos**, Edw. Tr. A. E. Soc. 3, 276.
Hab.—Texas; Georgia.

463. **Samoset**, Scud. Pr. Ess. Ins. 3, 176.
Hegon, Scud. l. c. 3, 176.
Nemoris, Edw. Pr. E. Soc. Ph. 2, 507; l. c. 4, pl. 1.
Alternata, Gr. Rob. Tr. A. E. Soc. 1, 3.
Hab.—Northern and Middle States; Georgia; Wisconsin; Iowa; Ontario.

464. **Textor**, Hüb. Zutraeg. fig. 515, 516.
Oneko, Scud. Pr. Ess. Ins. 3, 176.
Wakulla, Edw. Tr. A. E. Soc. 2, 311.
Hab.—Gulf States; Georgia to Texas.

SECTION II.

PYRGUS, West.

465. **Ericetorum**, Bd. Ann. Soc. Ent. Fr. 2, 10, 313. Morr. 122.
Alba, Edw. Pr. E. Soc. Ph. 6, 206.
Hab.—California; Oregon; Arizona.

466. **Oceanus**, Edw. Tr. A. E. Soc. 3, 213.
Hab.—Arizona.

467. **Tessellata**, Scud. Syst. Rev. 52.
Oileus, West.
Oilus, Bd. Morr. 121.
Hab.—Atlantic to Pacific; Pennsylvania to Gulf of Mexico; Texas; Arizona.

468. **Centaureæ**, Ramb.
Ruralis, Bd. l. c. 2, 10, 311. Morr. 121.
Wyandot, Edw. Pr. E. Soc. Ph. 2, 21, pl. 5.
Hab.—New York; West Virginia; Colorado; Labrador.

469. **Ricara**, Edw. l. c. 4, 203, pl. 1.
Hab.—Colorado; California.

470. **Petreius**, Edw. Tr. A. E. Soc. 3, 195.
Hab.—Nevada; California.

471. **Cæspitatis**, Bd. Ann. Soc. Ent. Fr. 2, 10, 312, ♂. Morr. 121.
Hab.—California.

472. **Scriptura**, Bd. l. c. 2, 10, 312. Morr. 121.
Hab.—California; Arizona.

THANAOS, Bd.

473. **Brizo**, Bd.—Bd.-Lec. pl. 66, ♂. Harr. 309, fig. 132. Morr. 114.
Hab.—Atlantic, Southern and Western States; Texas; Kansas; British America; Ontario.

474. **Icelus**, Lintn. Ent. Cont. 1, 30, pl. 7, fig. 5, 6.
Hab.—New England; Middle States; Illinois.

475. **Lucilius**, Lintn. l. c. 1, 32, pl. 7, fig. 1, 2.
Hab.—New York; Middle and Western States; Dakota.

476. **Ausonius**, Lintn. l. c. 1, 34, pl. 7, fig. 11, 12.
Hab.—Middle States; West Virginia.

477. **Tages**, L.
var. *Cervantes*, Grasl.—Bd. Ann. Soc. Ent. Fr. 10, 310.
Hab.—California, (auct. Boisduval).

478. **Persius**, Scud. Pr. Ess. Ins. 3, 170.
Hab.—Northern, Middle and Western States; Colorado; New Mexico; California.

479. **Martialis**, Scud. Tr. Chic. Ac. N. Sci. 1, 335.
Hab.—Massachusetts to Georgia; Mississippi Valley; Kansas.

480. **Juvenalis**, F.—Sm.-Abb. pl. 21, ∗. Bd.-Lec. pl. 65, ∗. Harr. 309, ∗. Morr. 114.
Costalis, West.
Ennius, Scud.-Burg.* Pr. Bost. Soc. N. Hist. 13, 296.
Horatius, Scud.-Burg. l. c. 13, 301.
Virgilius, Scud.-Burg. l. c. 13, 302.
Terentius, Scud.-Burg. l. c. 13, 292.
Ovidius, Scud.-Burg. l. c. 13, 295.
Hab.—Atlantic and Gulf States; Mississippi Valley.

481. **Propertius**, Scud.-Burg. id. l. c. 13, 299.
Tibullus, Scud.-Burg. l. c. 13, 298.
Hab.—California.

482. **Plautus**, Scud.-Burg. l. c. 13, 304, ×.
Hab.—Florida.

483. **Tristis**, Bd. Ann. Soc. Ent. Fr. 2, 10, 311. Morr. 115.
Hab.—California; Arizona.

484. **Funeralis**, Scud.-Burg. l. c. 13, 293.
Hab.—Texas.

485. **Pacuvius**, Lintn. 28th. Rep. N. Y. State Mus.
Hab.—Arizona.

LINTNERIA, nov. gen.

486. **Zampa**, Edw. Tr. A. E. Soc. 5, 207.
Hab.—Arizona.

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* The species credited to Scud.-Burg. were characterized solely from peculiarities in the genital armor. I do not regard such a characterization as a "description" entitling a species to recognition, and declined to admit these in the Synopsis. But in deference to Mr. Lintner's wishes I give them here, as I would in exceptional cases give manuscript names. How valueless the genital armor is for specific distinctions may be inferred from the synonymy.—E.

PHOLISORA, Speyer.

487. **Catullus,** Cram.—Sm.-Abb. pl. 24. Morr. 115.
Hab.—Atlantic, Southern and Western States; Texas; Kansas; Colorado; New Mexico.

488. **Alpheus,** Edw. Tr. A. E. Soc. 5, 206.
Hab.—New Mexico.

489. **Hayhurstii,** Edw. l. c. 3, 22.
Hab.—West Virginia to Kansas; Texas; New Mexico.

ACHYLODES, West.

490. **Thraso,** Hüb.—Bd. Sp. Gen. 1, pl. 13, fig. 6.
Tamenund, Edw. Tr. A. E. Soc. 3, 215.
Hab.—Texas.

EUDAMUS, Swain.

Group I.

491. **Pylades,** Scud. Pr. Bost. Soc. N. Hist. 12.
Bathyllus, Harr. 312, fig. 135.
Nevada, Scud. Syst. Rev. 50.
Hab.—Northern States to Gulf of Mexico; Dakota; Colorado to California; British America.

492. **Bathyllus,** Sm.-Abb. pl. 22. Bd.-Lec. pl. 74. Morr. 106.
Hab.—Southern States; Kansas; New Mexico; occasional in New York.

493. **Lycidas,** Sm.-Abb. pl. 20. Bd.-Lec. pl. 71, *. Morr. 106.
Lyciades, Hüb.
Hab.—Southern States; Mississippi Valley; occasional in New York.

494. **Epigena,** Butler, Lep. Exot. 65, pl. 25, fig. 6.
Orestes, Lintn. 28th Rep. N. Y. State Mus.
Hab.—Texas, (coll. Meske).

495. **Cellus,** Bd.—Bd.-Lec. pl. 73, *. Morr. 105.
Hab.—Southern States; West Virginia; Kentucky; Arizona.

Group II.

496. **Hesus,** West.-Hew. Gen. Di. Lep. pl. 78.
Hab.—Texas.

497. **Amyntas**, F.
Lividus, Hüb. Samml. Exot. Schmett.
Savignyi, Latr.
Hab.—Florida, Key West.

498. **Tityrus**, F.—Sm.-Abb. pl. 19, ♂. Bd.-Lec. pl. 72, ♂. Harr. 310, pl. 5, ♂. Morr. 112.
Hab.—Atlantic States; Mississippi Valley; Kansas; Dakota; California.

Group III.

499. **Proteus**, L.—Sm.-Abb. pl. 18, ♂. Bd.-Lec. pl. 69, ♂. Morr. 106.
Hab.—Southern States.

500. **Simplicius**, Stoll. Supplt. pl. 39, fig. 6.
Eurycles, Latr.
Hab.—Texas; Arizona.

ERYCIDES, West.

501. **Urania**, West.-Hew. Gen. Di. Lep. pl. 79.
Hab.—Texas.

502. **Texana**, Scud. Syst. Rev. 47, ♀.
Hab.—Texas.

503. **Sanguinea**, Scud. l. c. 47, ♀.
Hab.—Texas.

PYRRHOPYGA, West.

504. **Araxes**, Hew. Desc. Hesp. 2, No. 3.
Hab.—Arizona; (coll. Wheeler Exp.).

MEGATHYMUS, Riley.

505. **Yuccæ**, Bd.-Lec. pl. 70. Riley, 8th. Mo. Ent. Rep. 169.
Hab.—Southern States; Arizona; New Mexico.

506. **Cofaqui**, Strecker, Pr. Ac. N. Sci. Ph. 1876, 148, ♀.
Hab.—Florida.

Species hitherto accredited to the North American fauna, but omitted in this Catalogue for want of authentication.

PAPILIONIDÆ.

PIERINÆ.

Callidryas Cypris, F.—Bd. Sp. Gen. 1, 623. Butler, Lep. Exot. 106, pl. 39.
Hab.—Mexico; New Mexico, (Edw. Synop.)

Rhodocera Marula, F.—Bd.-Lec. 71, pl. 23.=*Ecclipsis*, Cram.
Hab.—Mexico; Venezuela; Florida and New York, (Bd.-Lec.)

Rhodocera Clorinde, Godt.—Bd. Sp. Gen. 1, 599.
Hab.—Mexico; Brazil; New Mexico, (Edw. Synop.)

Colias Rutilans, Bd. Sp. Gen. 1, 642, pl. 3, C, fig. 3.
Hab.—Peru; United States, (Weidemeyer); California, (Ménétriés.)

Terias Midea, Mén.—Bd. Sp. Gen. 1, 659.
Hab.—Hayti; California, (Ménétriés.)

Terias Elathea, Cram.—Bd. Sp. Gen. 1, 664.
Hab.—Hayti; Surinam; Brazil; United States, (Weidemeyer); Florida, (Edw. Synop.)

Terias Palmira, Poey, Hist. Nat. de Cuba, 1, 249, pl. 24, fig. 4—6.
Hab.—Cuba; Venezuela; United States, (Weidemeyer); Georgia, (Edw. Synop.)

NYMPHALIDÆ.

HELICONINÆ.

Mechanitis Californica, Reak. Pr. E. Soc. Ph. 5, 223.
Hab.—Mexico; California, Los Angelos, (Reakirt.)

Ithomia Diaphana, Drury, 2, pl. 7.
Hab.—West Indies; United States, (Weidemeyer); Florida, (Edw. Synop.)

Ithomia Lycaste, F.—Reak. Pr. E. Soc. Ph. 5, 218.
Hab.—Mexico; California, Los Angelos, (Reakirt); Kansas, (Kirby's Cat.)

Ithomia Phono, Geyer, in Hüb. Zutr. Exot. Schmett. fig. 987—8. Scud. Syn. List, Bul. Buf. Soc. N. Sci. 1, 246.
Hab.—New Grenada; Florida, (Geyer.)

NYMPHALINÆ.

Ageronia Feronia, L.—Drury 1, pl. 10.
Hab.—Mexico; Central America; Texas, (Edw. Synop. auct. Reak. in lit.)

Ageronia Fornax, Hüb. Samml. Exot. Schmett.
Hab.—Mexico; Central America; Texas, (Edw. Synop. auct. Reakirt, in lit.)

Argynnis Astarte, Doub. Gen. Di. Lep. pl. 23.
Hab.—Jamaica; United States, (Doubleday.)

Argynnis Nenequis, Reakirt, Pr. Ac. N. Sc. Ph. 1866, 247.
Hab.—Rocky Mountains; Oregon, (Reakirt.)
This is *Dia.* Eur. Sp. and one of Lorquin's.

Argynnis Morrisii, Reakirt, l. c. 1866, 245.
Hab.—Oregon, (Reakirt.)
This is *Euphrosyne*, Eur. Sp. and one of Lorquin's.

Melitæa Theona, Mén. En. An. Mus. St. Petersburg, 1, 86, pl. 2.
Hab.—Nicaragua; Southern California, (Ménétriés.)

Phyciodes Ismeria, Bd.-Lec. 168, pl. 46.
Hab.—Carolina; Georgia, (Bd.-Lec.)
The figures purport to have been drawn by Abbot, and Mr. Scudder says were copied from an unpublished plate of Abbot's. The description in Bd.-Lec. is made up from their own plate, not from Abbot's. And no matter what the latter was, by the plate and description in Bd.-Lec. the species must stand or fall. An unpublished plate carries no authority, and it is not possible to tell from Bd.-Lec. what insect is intended.

Eresia Hermas, Hew. Exot. But. 3, pl. 5.=*Genigueh*, Reak. Pr. E. Soc. Ph. 5, 225.
Hab.—Mexico; Southern California, (Reakirt.)

Smyrna Karwinski, Geyer, in Hüb. Samml. Exot. Schmett.
Hab.—Mexico; United States, (Weidemeyer); Texas, (Edw. Synop.)

Victorina Steneles, L.—Cram. 1, pl. 79.
Hab.—Central America; New Mexico, (Edw. Synop.)

Apatura Idyja, Hüb. Samml. Exot. Schmett.
Hab.—Central America; Texas, (Edw. Synop.)

Megistanis Acheronta, F.=*Cadmus*, Cram. 1, pl. 22, fig. A. B.
Hab.—Tropical America; Texas, (Edw. Synop.)

Aganisthos Orion, F.—Bd.-Lec. 195, pl. 52.=*Odius*, F.=*Danae*, Cram.
Hab.—Tropical America; Florida, (Bd.-Lec.)

LIBYTHEINÆ.

Libythea Motya, Bd.-Lec. pl. 64.
Hab.—West Indies; Southern States, (Edw. Synop.)

ERYCINIDÆ.

ERYCININÆ.

Eumenia Minijas, Hüb. Samml. Exot. Schmett. Bd. Sp. Gen. 1, pl. 21, fig. 6.
Hab.—Mexico; Central America; Texas, (Edw Synop.)

LYCÆNIDÆ.

THECLINÆ.

Thecla Liparops, Bd.-Lec. 99, pl. 31.

This case is parallel to that of *Ismeria*—the plate credited to Abbot, and the description made up from the plate as it stands in Bd.-Lec. No such insect exists in nature, and science has made no provision for imaginary ones.

LYCÆNINÆ.

Lycæna Tejua, Reak. Pr. Ac. N. Sc. Ph. 1866, 245. Streck. pl. 10, fig. 3.
Hab.—Mexico; Southern California, (Reakirt.)

Addendum to List of Species.

Lycaena Lotis, Lintn. 28th. Rep. N. Y. State Mus.
Hab.—California, Mendocino. Allied to *Scudderii*.

Addenda to List of Authors.

Bunker, R.
Desc. Hesp.—Descriptions of Hesperidæ, by W. C. Hewitson.
Graslin, in Ann. Soc. Ent. Fr.
Kirby's Cat.—Catalogue of Diurnal Lepidoptera, 1871.
Scudder, S. H.—Synonymic List of the Butterflies of North America.
Scud.-Burg.—On Asymmetry in the Appendages of Hexapod Insects, by S. H. Scudder and E. Burgess, 1870.
Verh. Zool. Bot. Ges.—Verhandlungen Zoologisch-botanischen Gesellschaft in Wien.
Weidemeyer, J. W.—Catalogue of North American Butterflies, 1864.
Zoological Illustrations.—W. Swainson, 1820—21.

APPENDIX.

I give the definitions of Sections and Genera of the Hesperidæ as sent by Dr. Speyer, with his notes. The last three Genera were not mentioned by him. It is proper to say that Dr. Speyer ascribed Thymelicus, Pyrgus and Nisoniades to Hübner, and Amblyscirtes and Pholisora to Scudder. I am compelled, however, to substitute for these authors the names of the first one who defined each of these genera, and in the case of Thymelicus and the last two named, for this reason, to Dr. Speyer himself. If there has been an earlier definition of Thymelicus I have not been able to find it, though the name has been used by many authors from Stephens to this day. Nisoniades (1816) being rejected as a coitus name, and, were that not enough, for want of satisfactory definition, though it was used and defined by Westwood (1852), would give way to Thanaos, Boisd. (1832). Mr. Butler, who uses the coitus names liberally, nevertheless employs Thanaos, Bd. with this explanation: "the genus Nisoniades cannot stand, as its type is an Achylodes." Ent. Mo. Mag. 7, 97.—E.

HESPERIDÆ.

SECTION I.

Tibiæ generally with spines, at least the middle ones; male always without costal fold; usually, a black, scaleless discoidal stripe (stigma) on fore wings.

NOTE.—I have been unable to find a sharp limit between the two principal divisions of Hesperidæ characterized by Mr. Scudder, (Buf. Bul. 1. 195), and I doubt if such an one exists, unless perhaps indicated by the—not examined by myself—presence or absence of the corneous sheath "at the posterior extremity of the alimentary canal" in the males, which Mr. Scudder gives as a difference. The costal fold, mentioned by him, is wanting in some species of his Hesperides. (Pyrgus *Sao*, *Orbifer*, etc., Thanaos *Marloyi*). Nevertheless though the first quoted character should not be prevailing, the two tribes of Mr. Scudder seem to me to possess some natural rights. Therefore I have tried at least to indicate them. It seemed to me most natural to begin the series with those genera which are related to the bulk of the other Rhopalocera by the non-existence of the tibial epiphysis and the spurs on the middle tibiæ; the more as there exists no costal fold. I will not contend that this arrangement is the most natural; such

a judgment can only be given by one who has mastered the Hesperidæ of the whole world and not a mere fragment of them only. At the end of them is to be placed Euschemon at all events, which makes the transition to the Heterocera.—S.

CARTEROCEPHALUS, Led.

Tibiæ without tibial epiphysis; those of the hind legs without middle spurs; knob of antennæ elongate-ovoid; tip blunt, conical; last joint of palpi concealed by the long bristles of the middle joint; abdomen extending beyond the anal angle of hind wings.

Note.—The *tibial epiphysis* I call the mostly flat spine or lancet-shaped appendage on the inner side of the tibia of the fore leg, possessed by most of the Heterocera, but among the Rhopalocera by the Papilionidæ and Hesperidæ only. In the latter this appendage is externally covered with scales, interiorly and at the apex naked, and not reaching the end of the tibiæ.—S.

ANCYLOXYPHA, Feld.

Tibiæ with tibial epiphysis; those of the hind legs with middle spurs, (as in all the following genera). Similar to the foregoing genus; knob of antenna elongate-ovoid, rounded at tip, with a very short, slender spine attached to the last joint; last joint of palpi free, long, perpendicularly erected, slender, subulate; abdomen of male slender, twice as long as head and thorax; fore wings elongated, blunt; hind wings rounded, the costal margin long, surpassing the inner angle of fore wings; the inner margin short, not produced at the anal angle.

COPÆODES, Speyer.

Antennæ short, one-third as long as the triangular fore wings, at three-fifths of their length suddenly inflated to an ovoid knob, widely rounded in front, sub-truncate; last joint of palpi nearly free, perpendicular, a little recurved, subulate; hairs of the brush at base of antennæ dilated at tip; femora thinly villose; tibiæ nearly naked, those of middle legs with a pair of very short, fine spurs; abdomen glossy-scaled, hairless; the male with a fine black longitudinal stigma on the disc, which forms on the under side a prominent ridge, but is there covered with scales.

Note.—As much as I dislike the multiplication of genera, still less the separation of sinlge species, I feel myself compelled by the striking difference of character between a whole series of organs to separate generically *Procris* and Thymelicus. I hope that the diagnosis of the new genus will justify the separation. The scaly hairs at the base of antennæ would not justify the creation of a new genus; they seem also to exist in some species of other genera between the common hairs of the brush.—S.

THYMELICUS, Speyer.

Antennæ half as long as fore wings; at three-fifths of their length gradually inflated to an elongate-ovoid knob; tip conical, blunt; last joint of palpi con-

cealed, half its length or more, by the long bristles of the middle joint, nearly perpendicular, straight, subulate, or linear, covered with scales; femora and tibiæ with long hairs; tibiæ of middle legs with a series of short spines; abdomen densely hairy; anal angle of hind wings produced; male with stigma which is not prominent on the under side; at the base of antennæ a brush of stiff hairs.

PAMPHILA, F.

Knob of antenna thick, ovoid, or elongate-ovoid; the tip suddenly bent with a much contracted, pointed little hook, nearly half as long as the knob, and composed of a larger or smaller number of joints; sometimes of the apical joint alone, which then is placed upon the thick end of the knob as a short slender spine (*Phylæus*); the last joint of palpi conical or nearly linear, hardly projecting beyond the bristles of the middle joint; tibiæ generally with spines, the strongest and most constant on the middle tibiæ, the most feeble on the anterior; in some species all the tibiæ are without spines; body stout; abdomen as long as the head and thorax, reaching the anal angle of hind wings, or surpassing; fringes unicolored. The anterior wings of the typical species triangular, the costal margin long, nearly straight, apex slightly pointed; the hind margin oblique, very little or not at all convex; the inner margin much shorter than the costal; hind wings more or less produced on the sub-median nervure, at least in the male.

In Group I, the wings a little broader, the apical angle of fore wings obtuse, the hind margin less oblique and more convex. The two species have the apical hook of antennæ a little longer and stronger, especially at the base, than the typical species; tibiæ with spines, but feeble on the fore and hind legs; the male without stigma. There are numerous differences in the shape of the hooks of the antennæ and the spines of tibiæ. In respect to the hook, *Phylæus* differs most, the antennæ being shorter than in any other species,—only half as long as the abdomen; *Metea* has the apical hook forming a thick bent cone. The tibiæ of *Vitellius*, *Conspicua* and *Metacomet*, have no spines at all. The spines of the tibiæ of fore legs are often feeble and indistinct and seem to be wanting in *Comma*, *Peckius* and *Osyka*. *Verna* has only the middle tibiæ spined; *Hianna* has the hind tibiæ spined, but only on the apical third interiorly, between the two pairs of spurs.

Note.—As to Pamphila; the differences in the shape of the knob of antenna, the spines of tibiæ, the character of the stigma, are very remarkable, but none of them lead to a natural arrangement of the species. This is least the case with the spines and stigma (presence or absence of), as appears at once when the species without spines on the tibiæ (*Vitellius*, *Conspicua*, *Metacomet*), or those without discoidal stigma, are compared, and opposed to all the others. In regard to the antennæ, *Phylæus* differs most, but is otherwise in all characters an entirely typical Pamphila, and in shortness of antennæ the otherwise widely different *Huron* is its nearest neighbor. The spines of the tibiæ on the fore legs, and sometimes on the hind legs, are so short and fine, that they are difficult to recognize, and in danger of being pronounced wanting, though they are

only covered by clothing of hairs or scales. Scudder has unfortunately not given diagnoses for his genera, and it is not clear to me on what characters he has based them. Under such circumstances, it seems to me best to put together the species I am able to study in what in my opinion is the most natural manner. In some respects *Massasoit* differs most, and I would not have hesitated to separate it and *Zabulon* generically, just as Scudder has done, if *Zabulon*, which could not be separated from *Massasoit*, had not given a transition to the typical species.—S.

Many of the species included in Pamphila were not examined by Dr. Speyer, and as he may not care to be held responsible for the arrangement of these, I give below the species examined in the sequence furnished me. It will be seen that they embrace examples in almost every sub-group, and with this aid I have disposed the remaining species.—E.

Group 1. *Massasoit; Zabulon.*

Group 2. *Sylvanus; Comma; Sassacus; Metea; Leonardus; Huron; Phylæus; Brettus; Conspicua; Ætna=Otho; Peckius; Mystic; Manataaqua; Cernes; Metacomet; Bimacula; Vitellius; Osyka; Hianna.*

AMBLYSCIRTES, Speyer.

Antennæ like Pamphila, with slender conical apical hooks; the two basal joints of palpi covered anteriorly with a rough clothing of bristles and scaly hairs; thorax and femora roughly hairy; apical joint of palpi a little prominent; middle tibiæ spined; body less stout than in Pamphila; abdomen thin, scarcely reaching the anal angle of wing; the costal margin somewhat strongly curved at base, in the middle a very little concave; hind wings not produced at the anal angle; fringes light, marked with black at the ends of the nervules.

SECTION II.

Tibiæ rarely spined; the male generally with a costal fold of the fore wing; no discoidal stigma.

PYRGUS, West.

Knob of antenna elongate or ovoid, rounded at tip, straight or a little semilunar, somewhat compressed; the brush at base of antennæ strong, longer than half the diameter of the eyes; palpi surpassing the front by more than the length of the eyes; the apical joint thick, bluntly conic, densely scaled; tibiæ (of species examined) without spines; fringes light, marked with dark at the ends of the nervules.

THANAOS, Bd.

Knob of antenna spindle-shaped, semilunarly curved, a little compressed; brush at base of antennæ strong, longer than half the diameter of the eyes, bristling; palpi surpassing the front by more than the length of the eyes, the apical joint thick, bluntly conic, a little inclined, a little surpassing the long bristles of middle joint; abdomen as long as head and thorax or a little longer;

tibiæ without spines, hind ones with long hairs; fringes unicolored; anterior wing of male with costal fold.

LINTNERIA, n. gen.

Differs from Thanaos in the knob to antenna, which is more slender and much less abrupt; in the palpi which are shorter and less thickly clothed with bristles; and in the angulated (*Daunus*) or crenulated (*Zampa*) outline of hind wings.

Note.—**L. Zampa.** This semi-tropical species I sent to Mr. A. G. Butler for determination, and he thus replies: "*Zampa* seems to belong to a group of species provisionally retained under Thanaos and of which I consider H. *Daunus*, Cramer, to be the type. This group will consist of *Daunus*, Cr., *Zampa*, Edw., *Motozi*, Wallgr., *Purendra*, Moore, and one or two undescribed species from Angola and Abyssinia. Our example (British Museum) of *Daunus* is from St. Domingo, *Motozi* from Natal, *Purendra* from India and Ceylon. It should certainly be separated generically, and I should be glad if you would give it a distinctive name. Cramer's figure of *Daunus* gives a false idea of the form of the species." Mr. Butler accompanied this with a pen drawing of *Daunus*, its antennæ, palpi, etc., and the definition of the genus is his own.—E.

PHOLISORA, Speyer.

Very similar to Thanaos; knob of antenna spindle-shaped, a little shorter than in Thanaos; apical joint of palpi more prominent; clothing of the two basal joints below snow-white; brush at base of antennæ with highly scaly hairs; anterior coxæ white; hind tibiæ with fewer and shorter hairs; body more slender; abdomen longer than head and thorax; wings broader, more rounded; hind margin of fore wing less oblique.

EUDAMUS, Swain.

Antennæ a little longer than half the costal margin of fore wings; knob very slender, spindle-shaped, bent hook-like just beyond the middle and extended to a long, fine point; brush at base of antennæ very short; one-quarter as long as the diameter of the eyes; palpi surpassing front less than length of eyes; apical joint short, thick, conical; tibiæ without spines; abdomen short, not reaching the anal angle of the hind wings; male with narrow costal fold.

Group 1. Hind wings on sub-median nervure little or not all produced.

" 2. There prolonged in a lobe.

" 3. There caudated.

Note.—As to Eudamus: The few species of this large genus which I have been able to study allow no judgment as to the propriety or necessity of splitting them into several genera. Herrick-Schaeffer denies that even the long-tailed species are to be separated generically. I have not been able to find any other difference, except in the shape of the wings, and these seem not to allow the constituting of well separated groups.—S.

ERRATA.

Page 5, line 19, for Otto read Adolf.

Page 7, for Herrick. Schaeffer, read Herrick-Schaeffer.

Page 7, for Lefebore read Lefebvre.

Page 7, for Ochsheimer read Ochsenheimer.

Page 16, No. 59, read *Chione*, Curtis, etc.

Page 19, No. 89, transpose Scud. Psyche to *Plexippus*, line below.

Page 24, No. 144, for **Phæton** read **Phaeton.**

Page 26, No. 168, read, var. ♀ *Pallida*, Edw. Pr. E. Soc. Ph. 2, 505.
Mata, Reak. (bleached example).

Page 29, No. 197, var. LINTNERII, for 3rd. Rep. N. Y. St. Ag. Soc., read 3rd. Rep. Ins. N. Y.

Page 30, No. 199, for FURCILLATA read *Furcillata.*

Page 30, No. 207, for Modesta, etc., read

Monima, Cram. 4, 387, F, G, ♀.

Hab.—Texas, (coll. Boll.) I submitted this species to Mr. Butler and he pronounces it to be *Monima.* The Florida species in my collection is a different thing, and yet undetermined.

Page 33, No. 234, for West.-Hen., read West.-Hew.

Page 34, No. 243, for West.-Hen., read West.-Hew.

Page 34, No. 247, read *Tyndarus*, Esp., var. *Callias*, Mead.

Page 36, No. 269, for West.-Hen., read West.-Hew.

Page 46, No. 374, for *Minehaha*, read *Minnehaha.*

Page 47, No. 377, read *Antægon.*

On the Classification of Butterflies, with special reference to the position of the EQUITES or Swallow-tails.

BY SAMUEL H. SCUDDER.

The family groups into which butterflies should be primarily divided have been variously given, all the way from two to sixteen. As the structure of the different stages becomes better known, there is an increasing proof of the intimate connection of many of the groups formerly believed very distinct, and it is generally conceded by the better class of recent writers, that there are only about half-a-dozen principal groups. My own study of their structure and transformation leads me to divide them primarily into four families, viz.:

The brush-footed butterflies or NYMPHALES (= Nymphalidæ Bates.)*

The gossamer-winged butterflies or RURALES (= Erycinidæ et Lycænidæ Bates.)

The typical butterflies† or PAPILIONIDES (= Papilionidæ Bates.)

The skippers or URBICOLÆ (= Hesperidæ Bates.)

The family nature of the last group has never been questioned by any who look upon the butterflies as composed of more than one family; indeed their distinction from the others is so marked that some have considered the remainder of the butterflies their equivalent in value; that is, they divide all butterflies into only two families or tribes.‡ Doubtless, these skippers first separated from the common stock and never developed to a high degree, since they still remain by far the lowest of the group and are in many points more closely allied to some of the higher moths, than they are to any other butterflies. They are peculiar for their robust body, broad head, hooked antennæ, which are widely separated at base, great length of tongue,

* I have given in parenthesis the corresponding "family" groups of Bates (Journ. Ent. I, 219—20), since the arrangement here proposed agrees more closely with his than with that of any other naturalist. The only exception to complete general equivalency is his separation of the Rurales into two families (whereas I look on those divisions as sub-families), and his placing the Libytheidæ as the highest member of his Erycinidæ, while I would place them as the lowest member of the Nymphales.

† I call these typical (as Swainson called them "true butterflies,") because they include the commonest butterflies of the north temperate zone, the white and yellow butterflies, or the insects most familiarly known as butterflies to the world at large.

‡ See the writings of Geoffroy, Fabricius, Leach, Dalman, Latreille, etc.

small wings, and the presence of a middle pair of spurs on the front and hind legs, in the former developed as a curious foliate epiphysis; their eggs are broadly truncate spheres, sometimes ribbed; their caterpillars have a large head, with a very thick skull, a very contracted neck formed of the first body-segment, and bearing a corneous shield above, and a body covered with minute papillæ, bearing microscopic hairs; their chrysalids are smooth and uniform like the pupæ of moths, but in rare instances (e. g. Calpodes*), are pointed in front.

The other three families appear to have diverged simultaneously from each other shortly after their common separation from the skippers. This latter family is the most homogeneous; each of the others comprises a considerable variety of structural types, for which it is difficult, in each case, to find a common expression. The Papilionides however, may be known by the squareness of the head between the eyes, the entire inner margin of the eyes, the diminutive size and frequently lamellar structure of the prothoracic lobes, the acuteness of the front of the meso-scutellum, and the notched or produced, instead of entire, dorsal margin of the eighth abdominal segment of the male; in the entire inner margin of the eye, they agree altogether with the Nymphales, but from these they may also be distinguished by the presence, as in the skippers, of a fourth median nervule on the front wing, or by its entire absence; for in the Nymphales it is always transferred to the sub-costal nervure. There are many other particulars in which the sub-families of Papilionides may be distinguished from all other butterflies, but in which they do not agree together; the same is also true of the sub-families of the higher groups.

The eggs of Papilionides, so far as known, are either nearly globular and smooth, or are ribbed and much higher than broad, and in these respects differ, so far as I am aware, from very nearly all higher butterflies.† The egg of Parnassius however, is an extraordinary exception, resembling that of the Lycænids described below. The caterpillars are never spined, but either approximately naked, pilose, or provided with fleshy tubercles or filaments. The chrysalids are hung by a loose girt, and are the only girt chrysalids which have the head armed in front with a single central prolongation or a pair of prominent tubercles.

One characteristic mark of the gossamer-winged butterflies is their

* See Dodge in The Rural Carolinian III. 594, (1872).

† The egg of *Danaida Plexippus* and, approximately, those of Brenthis, come near the latter class.

ordinarily small size, and to this we may add the tenuity and general delicacy of their structure; their head between the eyes is usually very narrow or twice as high as broad, so that the eyes are approximated, and infringe to such an extent upon the antennal scrobes, as to excise to a greater or less extent their own inner margin; the meta-thorax is less distinctly separated from the meso-thorax than usual; the front wings are pretty uniformly broad, rarely as elongate as in other families, and both wings are entire, excepting when the hind pair is tailed; in the heteromorphous character of the fore legs in the two sexes they may be known from all other butterflies, excepting the very lowest Nymphales (Libytheidæ), which, on that account, have been placed with them by Bates and some recent authors.

The transformations of so few of the higher group of this family are known, that it is impossible to make any general statement concerning them. But the eggs of the Lycænids or lower sub-family are peculiar for their echinoid or turban-shaped, heavily pitted form, in which respect only Parnassius appears to agree with them. The caterpillars are remarkable for their onisciform shape and gliding motion, their nearly aborted pro-legs, the minuteness of their head, and its power of complete concealment within the first body-segment; they are hairy, but never bear spines or filaments. The chrysalids are short and compact, completely rounded and closely attached to the surface by a girt; the cremaster is wanting, and the hooks seated directly upon the last abdominal segment, which, like the head, is completely carried over to the under surface of the body.

Doubtless the early stages of the Erycinids agree to a certain extent with those of Lycænids, but not altogether, for the only egg known (that of the European species), is described as almost globular and smooth; the head of the caterpillar cannot be so completely withdrawn, and the body is furnished to some extent with filaments or possibly spines and only appears subordinately onisciform. Still, so far as known, the early stages of Erycinids agree better with those of Lycænids than with any other butterflies, and these features, with the compact form of the chrysalis and its closely girt attachment to its support,* together with the opposite development of the fore legs in the two sexes of the imago and the close similarity of all other points in the structure of the perfect form, including the absence of the nervule attached in all other butterflies, excepting the Pierids, to

* According to Bates, the pupa of Stalachtis, one of the highest Erycinids, is "secured rigidly by the tail in an inclined position, without a girdle;" this mode of suspension forms a natural passage to the freely hanging Nymphales.

the end of the median nervure of the fore wings, show that no family distinction should be drawn, as has usually been done, between these two groups.*

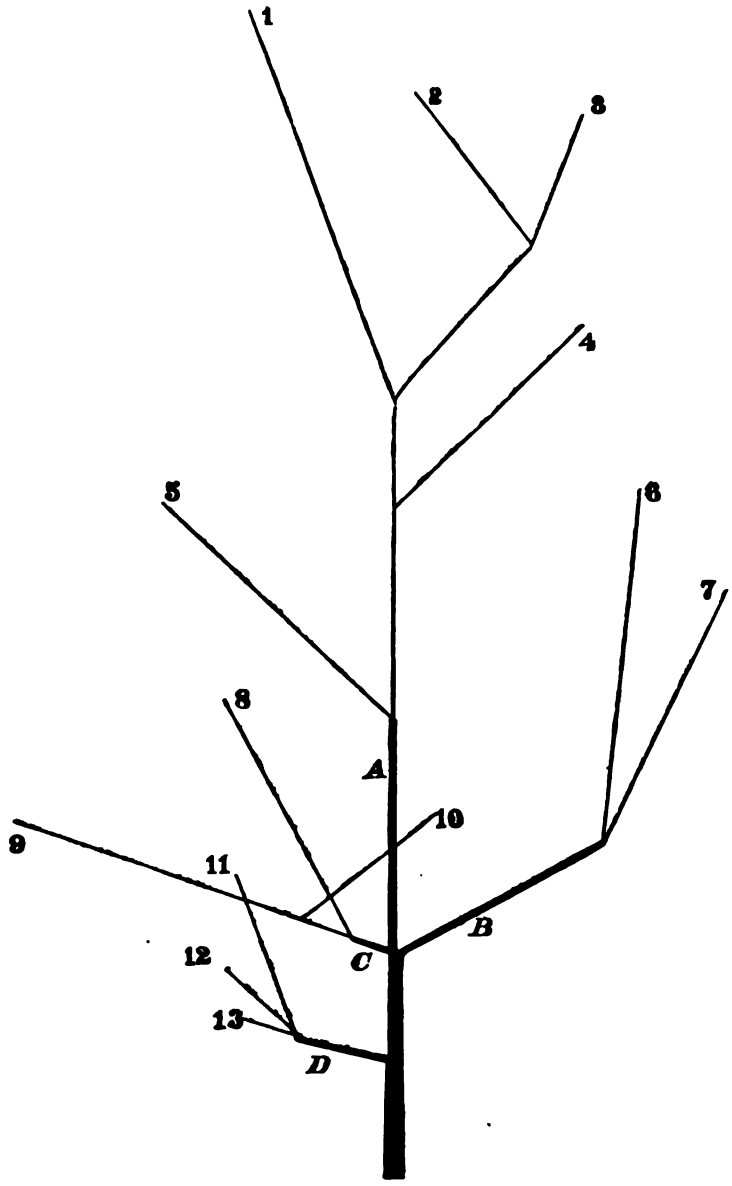
In the form of the head, the highest family agrees very well with the Papilionides, although as a rule it is considerably narrower, standing in this respect midway between the two middle families; the inner edge of the eye is entire; the prothoracic lobes are moderately large and tumid, and the nervule, attached to the end of the median nervure of the fore wing in the lowest butterflies, is here transferred to the sub-costal nervure, becoming a second inferior sub-costal nervule, which does not exist as such in any other family. Its presence in all the members of this family warrants the restoration, by Bates, of the ancient limits of this group, which, of recent years, has been torn by systematists into so many fragments. It does not however confirm his removal of the Libytheans to the next lower family, although in one of the most prominent and important features of the Nymphales—the atrophy, though still unequal, of the fore legs of both sexes—the Libytheans show their close relationship to the Erycinids, since the legs of their females are normal.

The eggs of the brush-footed butterflies are always either reticulate or ribbed, seldom greatly higher than broad, never smooth, but occasionally so heavily reticulated as rather to be termed pitted; in these cases however, the division walls are extremely thin and never, as in the Lycænids, coarse. The caterpillars are pilose, spinous or armed with filaments or tubercles. The chrysalids never have a perfectly even contour, but show at least some rounded or angulate projections; and usually the head is armed, more or less conspicuously, with a pair of projecting tubercles; they are invariably suspended by the tail alone, or rarely are not suspended at all.

By means of the diagram given on the next page† I have attempted to exhibit the apparent relation of the different groups to each other; the position of the main branches and their divisions is supposed to indicate, on the basis of existing affinities, the relative time at which

* Cf. my paper on the structure and transformations of *Eumæus Atala*. Mem. Bost. Soc. Nat. Hist. II, 431 seq. (1875).

† Explanation of Diagram.—A, Brush-footed Butterflies, *Nymphales*. B, Gossamer-winged Butterflies, *Rurales*. C, Typical Butterflies, *Papilionides*. D, Skippers, *Urbicolæ*. 1, Satyrs, *Praetores*. 2, Danaids, *Festivi*. 3, Heliconians, *Heliconii*. 4, Nymphs, *Najades*. 5, Snout Butterflies, *Hypati*. 6, Erycinids, *Vestales*. 7, Lycaenids, *Plebeii*. 8, Pierids, *Danai*. 9, Swallow-tails, *Equites*. 10, Parnassians, *Parnassii*. 11, Large Skippers, *Hesperides*. 12, Small Skippers, *Astyci*. 13, *Castnioides*.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the different groups diverged from each other or from the main stem; and the height which each branch attains, the relative perfection of the highest members of that group. It is of course impossible to represent this with any accuracy on a flat surface; for one may properly conceive of a group only as a mass, composed of branches springing from a central core. The Equites and Ephori are thus brought at opposite extremities of the tree, whereas they are closely related to each other and disagree with all other groups, in the retractility of the head of the caterpillar;* this relationship however is indicated by each occupying the lowest twig of the branch on which it is seated, and both branches being closely connected at their base. The striking and unique peculiarities of certain groups is shown by their extreme divergence from the main stem: thus the Equites or Swallow-tails stand apart from all others in the possession of dorsal osmateria in the caterpillar and in certain special characters of the butterfly, shortly to be mentioned; the Ephori or Lycænids at the opposite extreme, in the onisciform nature and diminutive heads of their caterpillars; the Castnioides among the skippers by their close approach to the moths;† and the Satyrs (Oreades), by the forked tail of their caterpillars; the superficial affinity of this last group to the skippers is also indicated on the diagram by the directness of their line from the very base. It is one of the most curious features in the structure of butterflies that its highest and lowest members should resemble each other in so many minor points. For instance, the tone of coloring and pattern of markings on the wings of many Satyrs, as well as the position and general nature of the sexual marks on the front pair of some males, find a close counterpart on the wings of some skippers; so also the chrysalids of Satyrs are among the simplest, most rounded and compact in the whole family, approaching in this respect the lowest butterflies; nevertheless in all the prime features of their organization, the Satyrs outrank all others or divide the honors with the Danaids.

The Libytheans or snout butterflies are placed at no great distance

* I do not know that attention has ever been drawn to this feature in the caterpillars of Equites, since the time of Denis and Schiffermüller, who say (Syst. Verz. Schmett. Wien, 161,-1775), "Diese Raupen . . . ziehen den kleinen stumpfen Kopf gern unter den ersten Ring zurück." When at rest the head is nearly half concealed by the extended epidermis of the first body-segment, and can be compared with nothing in other butterfly caterpillars, excepting the complete retractility of the head in Lycænids.

† Cf. Riley's admirable paper entitled Notes on the Yucca Borer (Trans. Acad. Sc. St. Louis, III, 323 seq.); see also his Reports on the Insects of Missouri, VIII, 169 seq., IX, 129.

from the Pierids, on account of the close resemblance of the caterpillars of the two groups; their position far removed from the other brush-footed butterflies is intended to mark their anomalous structure, while their slight elevation above the Erycinids signifies the nearly equal development of the fore legs in both sub-families. The Parnassians resemble the Lycænids in the egg state, and to a certain extent the Erycinids in their larval state, and are therefore turned toward the Gossamer-winged butterflies, though belonging closely with the Swallow-tails. The resemblance of the egg of the Hesperides and Pierids on the one hand and of the smaller skippers and Swallow-tails on the other is shown by the direction of the branches of the lowest family. By this scheme, all the spinous caterpillars are brought together upon one side, and near together, and all the heteropodous butterflies are carried above the middle.

It may be remarked that, with slight variations, this distribution of the groups of butterflies, founded upon the relative perfection of their organization is generally accepted by the best investigators; and is founded upon a mass of minor features which will not be recounted here. A single exception should however be made in regard to the typical butterflies, whose position is the point of greatest dispute, many continuing to place them highest of all on account of the beauty and special perfection of character of a single member of that family, the group of Swallow-tails. Nothing can exceed the gorgeousness of the huge Ornithopteras of the East Indies, and the most queenly of our own butterflies are their nearest relatives. They also show a unique development, as has been thought, in the diminutive size of the palpi of the imago, in the possession of four branches to the median nervure of the front wing, and in the dorsal and extreme development of osmateria in the caterpillar. But there is no reason whatever for considering the brevity of the palpi or the extra branch of the median nervure marks of high organization. On the contrary, in these very points they resemble the skippers more closely than they do any other butterflies, and these features are therefore traces of their low organization. Indeed the terminal median nervure of the Swallow-tails is the most unstable in its attachments of all the nervules of the fore wing; it appears to belong decidedly to the median nervure only in the Swallow-tails, but there can really be no doubt that it is a part of the same nervure in the skippers; while in the Nymphales it has simply transferred its allegiance to the sub-costal nervure; and if it exist at all in the Rurales, which we doubt, it is the nervule usually connected with both nervures by an equally obsolete vein, but be-

longing properly to the sub-costal, of which it is the only inferior branch.

The possession of the peculiar scent organ, however, is unquestionably a mark of high development. Wallace writes:* "When we consider this singular apparatus, which in some species is nearly half an inch long, the arrangement of muscles for its protrusion† and retraction, its perfect concealment during repose, its blood-red color, and the suddenness with which it can be thrown out, we must, I think, be led to the conclusion that it serves as a protection to the larva, by startling and frightening away some enemy when about to seize it, and is thus one of the causes which has led to the wide extension and maintained the permanence of this now dominant group. Those who believe that such peculiar structures can only have arisen by very minute successive variations, each one advantageous to its possessor, must see, in the possession of such an organ by one group, and its complete absence in every other, a proof of a very ancient origin and of very long-continued modification. And such a positive structural addition to the organization of the family, subserving an important function, seems to me alone sufficient to warrant us in considering the Papilionidæ as the most highly developed portion of the whole order, and thus in retaining it in the position which the size, strength, beauty, and general structure of the perfect insects have been generally thought to deserve."

It is unphilosophical, however, to accord high rank to any group for a single characteristic, and especially when in nearly all its other important peculiarities, it evinces its low origin. Moreover extensive fleshy organs do occur in other groups.‡ Guenée discovered them on the abdominal segments of the caterpillars of certain blues,§ and caruncles, as they are called, entirely similar to osmateria in function, general structure and degree of development, occur in single genera of beetles,‖ while totally absent from their nearest allies; yet nobody

* Wallace, Natural Selection Am. Ed. 135. It may be remarked that in his recent work on Geographical Distribution, Wallace has abandoned his former position and accepted the arrangement proposed by Bates.

† Protrusion is probably effected by mere contraction of the body-walls, which fills the osmateria with the fluids of the body.

‡ I have elsewhere maintained that the ventral sac on the first body-segment of butterfly larvæ is essentially homologous with the osmateria. See Psyche I, 168.

§ Ann. Soc. Ent. France, (4), VII, 665 seq. (1867).

‖ Malachius et al. See Siegel, Ueber den Ausstülpungs—Apparat von Malachius und verwandten Formen 8° Hannover, 1873.

on that account claims for them a high rank. In the larva of Cerura we find a much more extraordinary special development than the caterpillars of the Swallow-tails can boast; the anal prolegs become long, cylindrical tubes, extending backward and upward, from out of which when provoked, the caterpillar thrusts a highly colored and banded fleshy tentacle, with which it lashes its body to frighten away intruders. Yet in other points of its structure it perfectly agrees with its kindred. Then again if we examine the lips of the closed osmateria of the Swallow-tails, we shall find them of a corneous nature, resembling no other feature in butterfly larvæ than the chitinous dorsal shield on the first segment of the caterpillars of skippers; we have therefore in the osmateria themselves indications of a low origin, a relationship with the skippers which most other points in the structure of the Swallow-tails exhibit. The recurved club of the antenna recalls most strikingly the structure of the antennal tip of the higher skippers* and are unlike those of any other group of butterflies. The inner border of the hind wing also is folded longitudinally just as it always is in the skippers and rarely in other butterflies; moreover this fold is utilized in many males for the concealment of peculiar sexual hairs, and thus becomes very similar to the costal fold on the fore wings of many male Hesperides, and quite unlike anything else in other butterflies. But perhaps the most striking point of affinity between these two groups lies in the possession, on the front tibiæ, of the same characteristic foliate epiphysis, which is wanting in all other butterflies;† this, like the possession in skippers of two pair of spines on the hind tibiæ is certainly a mark of degradation, by which they are allied to the lower families of Lepidoptera. The eggs of the Swallow-tails, so far as known, are subspherical with a flattened base and almost absolutely smooth, in which they are unlike the eggs of any other butterflies excepting those of the Astyci among the skippers (and excepting, perhaps, that of Nemeobius), while those of the Pierids have closer resemblance to the eggs of Hesperides.‡ We find therefore that in the very peculiarities of their structure wherein they depart from the higher butterflies, they are most closely related to the skippers.

But again the Swallow-tails are universally conceded to be so closely allied to the Pierids that they are invariably placed next them; con-

* Compare, for example, the antennæ of *Iphiclides Ajax* and *Hesperia ruralis*.

† Cf. Speyer, Oken's Isis, 1843, 166.

‡ See my paper on the two principal groups of Urbicolæ. Bull. Buff. Soc. Nat. Sc. I, 195—6.

sequently if the Swallow-tails are placed highest in the scale, the Pierids must go with them; nobody questions this; *yet the Pierids possess not a single one of the characteristics by which a high rank is claimed for the Swallow-tails.* Commentary upon this is needless.

Further than this, in several features now to be mentioned, we may trace a regular progression in passing from the lower to the higher butterflies. These features indicate with little doubt the actual progress of events in the geologic history of higher lepidopterous life, and leave a record of advance which is completely falsified by removing the Swallow-tails to the summit of the order. Attention has been drawn to one of these features by Bates, who, at the same time proposed one of the most rational systems yet advanced;* it has however been known and used in dividing butterflies since the time of Linné and Geoffroy.† I refer to the structure of the legs, where fundamental distinctions occur among butterflies. In the lowest family or skippers, as in the moths, all the legs are developed to an equal extent; they only differ in proportional length. In the Swallow-tails and in all the other members of the family of Papilionidæ this also is true. But the moment we leave these two lower families, a change appears in the front legs and progresses regularly. In the gossamer-winged butterflies all the legs of the females are alike, but the front pair of the male is variously aborted; in the Lycænids the tarsi of this sex have lost the terminal claws and are densely spined beneath; even within this group we can trace gradations, the claws being first replaced by a single curving spine, and then by a pair of straight spines only a little longer than the others; in the Erycinids, the tarsi are spineless, and the joints are reduced from five to two or even one. In the highest family, the brush-footed butterflies, atrophy of the fore legs has reached both sexes, so that they are practically useless, although the atrophy is much more excessive in the male; the legs of the female are greatly reduced in size, and lack the terminal armature; while in the male of the highest groups, they are exceedingly diminutive, and the tarsi are reduced to a single minute joint. Now when we remember that this atrophy affects only the legs borne by

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* Journ. Ent. I, 218—22. (1861); II, 175—77, (1864); Trans. Linn. Soc. Lond. XXIII, 515, (1862).

† See particularly Dalman's admirable paper: Forsok till systematisk Uppställning af Sveriges Fjarilar, (Vetensk. Acad. Handl. XXXVII, 48 seq. 1816); or the abstract of it in Oken's Isis, (1824, 416 seq.). His classification has been pretty closely followed by his countryman Wallengren, (Lepidopt. Scand. Rhop. 8° Malmo, 1853).

the first segment of the thorax, and that this very segment and this only in passing from the low larval stage to the perfect form has become greatly reduced in size, we must accept atrophy of *these* legs as a conclusive mark of high organization.

If again we examine the tongue, we shall find, as we pass upward, a regular increase of complication in the structure of the papillæ or organs of taste; at least this is true in the fifty or sixty species I have examined. In the Swallow-tails and their allies, as in the skippers, these papillæ are merely minute distant tubercles, situated near the tip, half a dozen or less on either side, seldom rising much above the surface. In the gossamer-winged butterflies they are longer, much more frequent and often mammilate at the tip. While in the brush-footed butterflies they are crowded closely together, are often half the breadth of the tongue in length and frequently trifid or tri-mammilate at their tip.

Finally, how do the modes of transformation affect the question? The moths, as a general rule, pass their chrysalis stage in a cocoon of silk or earth, in which they lie loosely in a horizontal position. The skippers also undergo their transformations in a cocoon, a light fragile affair it is true, but still unquestionable a cocoon; one or two other butterflies also make a slight cocoon, wherein to change to chrysalis; and these few instances, such as Parnassius and Zegris, belong exclusively to the same family as the Swallow-tails, though not to the same precise division.* The skippers, however, do not lie loosely in their cocoons, as do the pupæ of moths, but spin at either end a Y-shaped thread, into the centre of one of which they plunge their hooked cremaster, while in the upper loop of the other they rest their body. Now when we reach the next family, the typical butterflies, the cocoon, save in the exceptional instances mentioned, is lost, while the silken attachments of the chrysalis still remain, modified to suit the circumstances. Instead of the Y-shaped band, wherein to plunge the cremaster, a carpet of silk is woven upon some branch, into the midst of which the hooks are thrust, while the omission of the stem of the other Y leaves a loop or girt about the middle. To accommodate the chrysalis thus hung next a solid substance, instead of in the middle of an oval cell, the segments of the abdomen must curve upward to-

* Mr. W. H Edwards (Trans. Am. Ent. Soc. VI. 3), endeavors to explain this cocoon in Parnassius as a "biological necessity" from its exposed position on Alpine heights; probably he was not aware of the occurrence of the cocoon in Zegris, which is common on the plains of Southern Spain. See Rambur, Faun. Ent. Andal. II, 247, pl. 11, fig. 4.

ward the ventral line (for the chrysalis lies upon its back), and thus the ventral outline becomes straight, while the dorsal is strongly arched. This condition of things is perpetuated and often intensified in the next higher family, the gossamer-winged butterflies, which differ in this respect from the typical butterflies only in the closer binding of the girt around the middle. In the highest family, the brush-footed butterflies, the girt around the middle is lost and the chrysalis hangs suspended by the tail alone. We see therefore a regular progression from the lower to the higher butterflies, in the loss first of the cocoon, next of the girt; and as if this were not enough, some of the highest butterflies* have even lost the last remnant of silk and fallen to the earth, where, amid stubble or in crevices in the ground, they undergo their transformations without more ado. As if moreover to show that this suspension of the chrysalis by the tail alone is a stage beyond that of hanging by tail and girth, we have a clear proof that all the suspensi, as Boisduval happily calls them, have passed through the stage of the succincti, since *the straight ventral surface of the abdomen*, assumed perforce by the succincti, when they left the cocoon stage and became attached to hard surfaces, *still remains in the chrysalis of the brush-footed butterflies, where it no longer serves any purpose*,—as clear and striking an indication that the suspensi outrank the succincti, as that the pupa is higher than the larva.

* *Oeneis semidea, Agapetes Galathea, Nytha Circe* and *Eumenis Semele.*

Synopsis of the Genera and Species of the Staphylinide tribe TACHYPORINI of the United States.

BY GEORGE H. HORN, M. D.

This tribe contains those genera and species in which the prothoracic spiracle is not covered by the side pieces and the antennæ inserted under the side margin of the head, behind the base of the mandibles and usually immediately in front of the eyes.

There is at times a little trouble in deciding positively concerning the insertion of the antennæ, as in certain short-headed *Bolitobius* the antennæ become as it were pushed upwards and the line of demarcation between the present tribe and the group Quedii of the next tribe becomes partially obliterated.

As certain heretofore unused characters become prominent in the succeeding pages, each portion of the body will be taken up by itself so that special characters may be mentioned and explained, and the differences and resemblances of genera shown before any tabular arrangement is given.

HEAD broadly oval in most genera, transverse in *Hypocyptini*, elongate to a variable degree in *Bolitobius*. The sides beneath the eyes distinctly margined, Bolitobii, or without margin in the other groups.

ANTENNÆ eleven-jointed gradually broader to apex, ten-jointed in Hypocypti and with the last three joints stouter or forming a club. Filiform in most genera, slightly compressed in others or slender, loosely articulated, ten-jointed and verticillate, *Habrocerus*, (fig. 30,* a).

MAXILLARY PALPI usually slender, four-jointed, the first very small, second and third equal in length, the latter always stouter, fourth variable, as follows;

slender, elongate, acute at tip, *Habrocerus*, (fig. 35, d);

subulate, *Mycetoporus*, *Conosoma*, *Tachyporus* and the Hypocypti, (fig. 35, c);

conical, *Bryoporus*, (fig. 35, b);

filiform, *Tachinus*, *Bolitobius*, *Cilea*, *Physetoporus* and *Erchomus*, (fig. 35, a).

SCUTELLUM visible, triangular; concealed in *Hypocyptus* and *Anacyptus*.

ELYTRA variable in length, prolonged below the sides of the body

* The figure was copied from Erichson and has one joint too many for our species.

in *Erchomus* and *Anacyptus*. Margined at the sides and with distinct epipleuræ, except in *Trichopsenius*.

ABDOMEN margined in all the genera except *Conosoma* and *Trichopsenius* and very feebly in *Anacyptus*.

MESOSTERNUM not carinate in most genera, carinate in *Cilea*, *Physetoporus*, *Erchomus*, *Conosoma* and feebly in *Anacyptus;* flat or feebly concave in *Hypocyptus;* the coxæ rather widely distant *Hypocyptus*, (fig. 4), contiguous in *Habrocerus* and *Trichopsenius*, (fig. 2), and very narrowly separated in the other genera.

METASTERNUM, prolonged in front separating the middle coxæ, in *Hypocyptus;* not prolonged between the coxæ in all other genera. Posterior margin more or less sinuate, rectilinearly truncate in *Anacyptus*, (fig. 3).

POSTERIOR COXÆ, free in all the genera except *Trichopsenius*, (fig. 2), in which they are connate with the metasternum, form variable, usually with a broad expansion concealing the first and part of the second abdominal segments, which is parallel or narrowed externally; articular plate small not concealing the trochanter, rarely *Anacyptus* large, concealing the trochanter and part of the femur. In *Habrocerus* the posterior coxæ consist of the triangular plate merely which conceals the trochanter, (fig. 30).

POSTERIOR TROCHANTER, moderately long, usually truncate at tip, rarely broadly oval, *Trichopsenius*, (fig. 2).

FEMORA, with several setiform hairs from the lower margin at apex frequently absent from the anterior and posterior and entirely wanting in the Hypocypti.

TIBIÆ usually spinulose, except in *Hypocyptus* and *Anacyptus*, the anterior tibiæ of *Conosoma* not spinulose but margined with very short closely placed setæ. Tibiæ at tip fimbriate with unequal spinules except in *Conosoma*, *Bryoporus* and some *Mycetoporus* in which the spinules are short, equal and closely placed. Terminal spurs two in number except in *Conosoma* where there appears to be one only on the anterior and posterior pairs and two to the middle pair except in two species where one only occurs.

TARSI, five-jointed, in the Hypocypti four-jointed.

All of the special characters mentioned above receive greater mention under the genera in which they occur, one however requires extended notice here.

Under the side of the head in the Bolitobii, (fig. 31), may be seen a distinct groove limited beneath by a ridge which starts at the sides of the buccal opening directly opposite and continuous with the lower

edge of the mandible, running backwards in a nearly straight line *under* the insertion of the antennæ and the eyes to the hind angles of the head, slightly curved upward posteriorly. This ridge is homologically equivalent to the margin of the thorax or more accurately the line of division between the upper and lower components of each segment of the body, and indicates that the mentum and maxillæ and their appendages are inferior while the antennæ, mandibles and labrum are superior. In some short-beaked Rhynchophora there is a very distinct suture, indicating the same structure, which starts from the lower border of the eyes, dips down under the head and beak so as to nearly surround the scrobe and passes forward to the side of the buccal opening. Similar faint sutures of like import have been noticed in various other families* in immature specimens, and a more extended study of these sutures about the head will enable its parts to be more correctly homologized with the other segments of the body.

The marginal ridge of the head is found in this tribe in the three genera constituting the group Bolitobii. It reappears as might be inferred in the closely allied group Quedii of the adjacent tribe Staphylinini, and finally entirely disappears in the genera allied to *Staphylinus*. I have seen the ridge in some Alæocharini also, but an investigation of the characters of other tribes not being pertinent to the present essay will be left for a future occasion.

From the importance of several characters noticed in the preceding pages it seems necessary to divide the genera into groups or sub-tribes. This has already been partially done by Fauvel in the "Fauna Gallo-Rhenane," in which three groups are established, one of which I propose to again sub-divide, based on other characters than those in the following table.

The following is the method of sub-division:

Posterior coxæ attaining the side pieces of the metathorax; usually expanded into a plate the free edge of which conceals the first and a portion of the second segment.

Antennæ ten jointed, tarsi four-jointed.....**Hypocypti.**

Antennæ eleven-jointed, tarsi five-jointed.

Head not margined.....**Tachypori.**

Head margined at the sides.....**Bolitobii.**

Posterior coxæ triangular. Antennæ ten- tarsi five-jointed.

Head not margined beneath.....**Habroceri.**

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*Since the above was written Dr. Leconte has noticed the existence of the ridge on the underside of the head in Cicindelidæ, and an examination made at once showed that while it exists in all our genera of that family it is not present in any of our Carabidæ. Should this hold good with genera not in our fauna it gives an additional character for separating the two families.

The second group contains those genera which may be considered central; that is, while they have evident affinities with the surrounding groups there is no relationship with any of the adjacent tribes. The Hypocypti have considerable affinity with the Alæocharini while the Bolitobii and Habroceri lead in different directions toward the Quedii, the first by the margined head, the second by the structure of the posterior coxæ which resemble the form seen in *Tanygnathus* and *Heterothops* very much more than they do any of the genera of the present tribe.

In all of the books the length of the elytra compared with the body, whether they extend merely to the hind coxæ or are prolonged so as to cover one or two abdominal segments, has been made use of in the separation of the genera allied to *Bolitobius* from the others. This seems entirely illusory and above all unnatural when genera evidently very closely allied like *Habrocerus* and *Trichophyus* are thereby separated even if they are again made to appear adjacent by an adroit manipulation of a table. (See Erichson, p. 28).

The genera of the groups are as follows:

HYPOCYPTI.

Middle coxæ widely separated; mesosternum flat or slightly concave in front. Antennæ moderately long, with the last three joints forming a loose club. Posterior coxæ free, with a small articular plate. Abdomen feebly margined. (Fig. 4).....**Hypocyptus.**

Middle coxæ narrowly separated; mesosternum carinate in front. Antennæ short, last three joints rather suddenly broader forming a rather compact club. Posterior coxæ free, with a large triangular articular plate concealing the trochanter and the base of the femur. Abdomen feebly margined. (Fig. 3).....**Anacyptus.**

Middle coxæ contiguous; mesosternum very narrow and deeply depressed between the coxæ, in front flat. Antennæ? Posterior coxæ connate with the metasternum the articular plates rounded arising from near the front of the metasternum not covering the trochanter which is broadly oval. Abdomen not margined. Elytra not margined. (Fig. 2).....**Trichopsenius.**

These characters really seem to have more than generic value, but the very few genera and the limited observation possible on the unique representative of one of them forbid at present anything more being done.

TACHYPORI.

Abdomen margined; tibiæ fimbriate at tip with unequal spinules.

Mesosternum not carinate.

Maxillary palpi filiform.....**Tachinus.**

Maxillary palpi with last joint subulate.....**Tachyporus.**

Mesosternum carinate; maxillary palpi filiform.
Epipleurae horizontal; elytra not extended.
Mesosternum very feebly carinate; anterior tarsi ♂ simple.... ....**Cilea.**
Mesosternum with strong crest; anterior tarsi ♂ dilated.
Physetoporus.
Epipleurae nearly vertical, elytra prolonged at the sides beyond the body.
Mesosternum strongly carinate; anterior tarsi ♂ simple...**Erchomus.**
Abdomen not margined; tibiae fimbriate at tip with short, equal, closely placed spinules.
Maxillary palpi subulate; body finely pubescent..... .....**Conosoma.**

CILEA (*Leucoparyphus*) is the only genus about which there is any difficulty. The mesosternum is so feebly carinate that it might be placed next to *Tachinus*, from which the simple tarsi of the male and the longer first joint of the hind tarsus will distinguish it.

BOLITOBII.

Maxillary palpi filiform.....**Bolitobius.**
Maxillary palpi with last joint conical, acute. .....**Bryoporus.**
Maxillary palpi subulate.....**Mycetoporus.**

The tibiae of *Bolitobius* are fimbriate with unequal spinules at tip, *Bryoporus* the spinules are short, equal and closely placed, as far as our species are concerned, while in *Mycetoporus* a portion of the species have one structure while the rest have the other.

HABROCERI.

Two genera *Habrocerus* and *Trichophyus*, belong to this group, the first only occurring in our fauna. The differences between the two seem to be of extremely feeble importance, the elytra of the first are longer than the breast while they are not longer in the second. By this character alone Erichson and others really widely separate these genera but by an ingenious arrangement of the synoptic table they are made adjacent and again (in the body of the work) separated by *Tachinus*.

The similarity of the hind coxae of *Habrocerus* and *Tanygnathus** has already been mentioned. The latter genus was placed by Erichson in the present tribe but has been removed to the sub-tribe Quediini for very good reasons.

HYPOCYPTUS Mann.

Antennae ten-jointed, first two joints robust, three to seven small very gradually longer and broader, eight to ten forming a rather loose elongate club, slightly compressed, each joint longer than that which

*T. COLLARIS, Er. Gen. Staph. p. 289.—Specimens agreeing with the description of this species have been captured by Dr. E. A. Schwarz, in Florida.

precedes. Maxillary palpi with third joint rather stoutly fusiform, fourth small, subuliform. Mesosternum slightly concave (not carinate), receiving the anterior coxæ when contracted; middle coxæ rather widely distant. Epipleuræ narrow, horizontal, elytra not projecting downwards beyond the body. Tarsi four-jointed. Posterior coxæ not connate with the metasternum, articular plate small not covering the femora. Head broad, eyes moderately prominent and coarsely granulated. Scutellum concealed. Body capable of contraction but not to the extent of *Liodes*, etc.

From the above description it will be inferred that several of the most important characters of the genus have been overlooked. The rather widely separated middle coxæ and the slightly concave mesosternum without carina seem to be very important characters and give the species of this genus their power of contractility. The posterior coxæ preserve the general characteristics of the tribe, there is the usual expansion partially concealing two abdominal segments and attaining the metasternal side-pieces, the articular plate is small, not concealing the trochanter and a part of the femur. The articulation between the coxæ and the metasternum is free.

Two species occur in our fauna:

Legs and antennæ pale testaceous.....**Ziegleri.**
Legs piceous, outer joints of antennæ piceous.....**Crotchii.**

H. Ziegleri, Lec.—Black, moderately shining, margin of thorax narrowly pellucid, legs and antennæ testaceous, surface sparsely clothed with greyish pubescence. Head very minutely and sparsely punctulate. Thorax nearly three times as wide as long, narrower in front, base broadly arcuate, surface sparsely minutely punctulate, sides near base narrowly pellucid, hind angles sub-rectangular. Elytra each one wider than long, convex, sparsely punctured and pubescent. Abdomen sparsely punctured and pubescent. Body beneath very finely and sparsely punctulate. Legs pale testaceous.

Male.—Sixth ventral deeply triangularly notched, (Erichs.).

Female.—Segments simple.

The unique female before me was found in Pennsylvania by Mr. Ziegler. In its contracted state it measures nearly .04 inch; 1 mm. It agrees so accurately with the descriptions of *longicornis* that I have doubts of its being distinct. Comparison will be made hereafter.

H. Crotchii, n. sp.

Resembles the preceding in most of the characters and differs as follows: Antennæ longer, joints three to seven especially, longer than the preceding species, joints eight to ten also more elongate and more distant, color testaceous at base gradually darker to tip. Legs piceous. Hind angles of thorax obtusely rounded. Elytra more distinctly punctured. Length .04 inch; 1 mm.

Male.—As in *longicornis*, first joint of anterior tarsus distinctly dilated.

I have seen but one specimen, collected by the late G. R. Crotch in British Columbia.

ANACYPTUS n. g.

Antennæ short, ten-jointed, first two joints stout, joints three to seven forming a rather close funicle with the joints gradually wider, last three joints forming a rather sudden club of elongate oval form, the first joint conical, second transverse, the terminal oval at tip and pubescent at its apical half with rather long pubescence. Maxillary palpi with the first joint very small, second moderately long and slender, third elongate oval, truncate at tip, fourth slender, subulate. Eyes moderately prominent, rather coarsely granulated. Mesosternum in front of coxæ short, not concave, distinctly carinate at middle, the coxæ narrowly separated. Metasternum posteriorly rectangularly truncate. Hind coxæ as in *Hypocyptus*, but with large articular plates concealing nearly half the femur. Elytra expanded beyond the body, epipleuræ broad but vertical. Abdomen very feebly margined. Tarsi four-jointed.

A very remarkable genus seeming to exhibit some affinity with the Trichopterygidæ notably *Limulodes*. The joints three to seven of the antennæ are conjointly very little longer than the second.

We have but one species in our fauna, but several that have been described as *Hypocyptus* from Europe and elsewhere seem to belong here.

A. testaceus, Lec.—Rufo-testaceous, moderately shining, sparsely pubescent, convex. Head broad, smooth, sparsely pubescent. Antennæ not as long as head and thorax. Thorax twice as wide as long, convex, very sparsely punctured and pubescent, base slightly sinuate on each side, hind angles sub-acute and slightly prolonged. Elytra each wider than long, arcuately narrowing to apex; apex conjointly emarginate, surface finely punctured in a very regular *quincunx*, the punctures connected by very fine oblique lines, sparsely pubescent. Abdomen feebly margined, sparsely punctured and pubescent, beneath slightly darker in color. Body beneath concolorous, metasternum and articular plate of hind coxæ punctured in regular *quincunx*. Length .03 inch; three-fourths mm. (fig. 3).

The resemblance superficially in color and form to *Limulodes paradoxus* is still further increased under the lens by the peculiar sculpture of the elytra which is nowhere else seen in the tribe. The expansion of the elytra downward beyond the body also resembles that insect, but beyond these points all resemblance ceases.

Four specimens from Georgia and three from Arizona, exhibit no specific differences.

TRICHOPSENIUS n. g.

Antennæ normally inserted, first two joints as in *Hypocyptus;* joints three to ten not seen. Palpi not present. Mesosternum short in front of coxæ and obtusely elevated, deeply depressed between the coxæ and very narrow so that the coxæ are contiguous without the cavities being confluent. Posterior coxæ connate with the metasternum, the articular plates connate at middle and arising from the face of the metasternum. Elytra not prolonged beyond the body, epipleuræ narrow, horizontal. Scutellum visible. Tibiæ distinctly spinulose. Hind trochanters broadly oval. Hind tarsi four-jointed, anterior and middle absent in the specimen. Abdomen not margined. Form oblong, depressed, surface glabrous, elytra with three transverse rows of setæ.

That this genus belongs to the present tribe there can be no doubt from the insertion of the antennæ, but it is equally certain that it is a rather anomalous member. The contiguity of the middle coxæ, the absolute fusion of the metasternum and the posterior coxæ and the articular plates arising apparently from each side of the middle of the metasternum and even extending forward close to the middle coxæ are certainly very remarkable characters.

The entire absence of antennæ (except the two basal joints), deprives me of the means of approximating this genus to its allies with absolute certainty. The four-jointed posterior tarsi cause me to place it provisionally near *Hypocyptus*, with the hope that at some future time perfect specimens may enable me to speak with greater certainty. The curious specific character found in the arrangement of the erect hairs on the elytra will enable the insect to be known whenever refound.

T. depressus, Lec.—Testaceous, very shining. Head and thorax smooth, shining, absolutely impunctured. Thorax not twice as wide as long, sub-depressed, sides slightly arcuate and a little narrower in front, base truncate, hind angles rectangular. Elytra each quadrangular with equal length and width, sub-depressed, smooth, glabrous, and with three transverse rows of erect setæ numbering four or five in each row. Abdomen conical, shining, sparsely setulose. Body beneath shining, abdomen sparsely setulose. Length .05 inch; 1.25 mm. (figs. 1 and 2).

The legs of this insect are relatively stouter than in any genus of the tribe. From the extremity of the abdomen there project two rather stout corneous processes. The abdomen is however so retracted that I am unable to say whether these are sexual or not.

One injured specimen, Georgia.

TACHINUS Grav.

From their superficial similarity the species of this genus are in great confusion in most if not all collections, owing to the fact that the characters which should be relied on for their separation, have been lost sight of by our collectors.

The sculpture is remarkably uniform, differing a very little with each species, not sufficiently to be described, yet enough to enable a mixed series to be separated with a very great degree of accuracy by an experienced eye. In this way the sexes must be approximated, if by any accident collections are in confusion. Color is of extremely little value and should never be depended on.

The characters made use of in the following tables are drawn entirely from the variations in form of the last two ventral and the terminal dorsal segments of the two sexes, but before giving the table it will be necessary to enter into some explanation of the characters so that they may be properly understood.

Males.—Anterior tarsi always dilated.

The last ventral segment in all the species is deeply divided forming processes (*laciniæ*), of varying shape, frequently long, slender and decurved, resembling somewhat the forceps of Forficula, often broader in the form of triangular plates. The sixth segment varies also in form and sculpture. In most species the hind margin is notched or emarginate and the surface concave or impressed, the impression in several instances extending on the fourth and fifth segments also. The surface of this concavity in the sixth ventral is sometimes entirely filled with very short and stout spinules among which dirt becomes entangled, so that Erichson and others have erroneously called this a spongy space. In other species this spinous space is of more limited extent and may be confined entirely to the middle of the posterior margin, or entirely absent. In a few species there is no concavity of the sixth ventral.

The hind margin of the sixth ventral may be truncate or variously emarginate and with a secondary emargination near the side. In the first eleven species the margin is fimbriate with stiff, closely set spinules forming a comb-like structure, the middle of the edge for a short distance being usually without them. Four moderately long, slender setæ belong to this segment, two arising from the surface in the usual position of the ambulatorial setæ, while two others more distant arise from the margin. In those species without the pectinate margin the

"spongy" space may occur, sometimes as a very narrow border along the middle of the hind margin and often as a hoof-shaped space usually of small extent.

The other abdominal segments present nothing of moment except in *fimbriatus* and *picipes*, in which the first two segments at middle are elevated in a carina. The last dorsal segment has a tolerably uniform structure in all the species, the tip being four dentate, the middle teeth more prominent, the lateral shorter and usually rectangular. In several species the middle teeth unite forming an obtuse process. The sixth dorsal presents nothing peculiar, the margin is either truncate or very slightly sinuate.

Females.—Anterior tarsi not dilated.

The structure of the terminal abdominal segments is much more complicated and difficult of description than in the males. To render the subject plainer it is well to start with the simpler form which occurs in *luridus* and *nigricornis*. In these the last ventral is said to be entire; it is wider than long, the sides regularly arcuate forming an oval tip. The tip is fimbriate with short, equal spinules, for a distance about equal to a fourth of the entire free edge of the segment, this fimbriate space is limited on each side by a minute tooth bearing a long, slender seta, and half-way between this and the anterior angle of the segment is another small tooth bearing a seta.

The next modification of this structure arises from the middle of the tip being very slightly notched, separating the spinules into two groups, while the lateral setæ arise from two well marked teeth on each side. This is the structure in *circumcinctus*. Parallel with this modification another occurs in which the lateral teeth become developed into processes, the middle lobe being thus rendered apparently longer although still entire at tip and fimbriate, *mimus*, *debilis*.

In *angustatus* the middle lobe becomes more deeply notched and prominent, but the two processes thus formed are still broad and with numerous spinules, the lateral teeth become more acute and longer.

From this form the development of the structure found in most of the species can be easily seen. The middle processes become gradually longer and more slender while the spinules degenerate into short hairs, the lateral teeth gradually elongate and become spiniform processes and their setæ shorter and more slender. The most advanced species in the slenderness of these processes is probably *fimbriatus*. From

their number the last ventral segment is usually said to be "six-spinous." The last dorsal however undergoes the most important changes, all however traceable to the development of a primary simpler form.

The simplest type of structure seems to be that of *maculicollis*, in which the last dorsal is deeply divided at middle forming two triangular processes broad at base, acute at tip. The first modification of this appears in *limbatus*, in which these processes become more slender and between them appears an oval plate acute at tip and about half their length. This middle lobe next becomes elongated so as to equal the lateral lobes and is bifid for a short distance at tip (*frigidus*), or becomes cleft entirely to base forming slender processes, similar to those at the sides. These in turn become one-fourth shorter than the lateral processes although slender, as in *angustatus* and several others. As these processes become still shorter they also become broader and finally unite forming a trapezoidal plate acutely notched at tip as in *fimbriatus*. The next change is in *memnonius* in which the plate becomes narrower, more elongated and with a small notch at tip, and finally it becomes as long and nearly as slender as the lateral teeth with the tip acutely divided as in *canadensis* and *tachyporoides* the division being at times (*instabilis*), so minute that the middle process is slender at tip, similar to those at the sides and equal in length. The middle process while remaining slender has a lateral tooth arise on each side, acute and much shorter than the main stem, as is seen in *Crotchii*. The three processes now (*instabilis*), approximate and finally (*nigricornis*, *luridus*, *circumcinctus*) unite, being separated at tip by a slight notch and a groove on the upper surface, the middle lobe is prominent and acute in *nigricornis* and *luridus*, or broader and emarginate at tip in *circumcinctus*.

These sexual modifications of TACHINUS form a very interesting study, without a knowledge of them it is impossible to separate the species correctly.

The following tables are based on the characters above mentioned, the males and females being considered entirely apart and independently of each other, although it frequently happens that the one sex of two species may be very similar while the opposite sex is altogether different.

The following will readily distinguish the males.

Sixth* ventral segment pectinate on its hind margin.

With spongy space on the lower face of the segment at middle.

Spongy space divided longitudinally, (fig. 5)..... **maculicollis.**

Spongy space entire, large.

Covering the entire impression of the segment, (fig. 6)..... **semirufus.**

On the centre of the impression only, (fig. 7)..... **memnonius.**

Without spongy space, merely a few scattered granular tubercles.

Sixth ventral broadly and feebly emarginate, the spinules forming a continuous series, (fig. 8)..... **tachyporoides.**

Sixth ventral narrowly and feebly emarginate, spinules arranged in a group on each side of the emargination.

Elytra smooth, last dorsal of male normal, abdomen shining, very sparsely punctured, segments not impressed, (fig. 9)..... **agilis.**

Elytra distinctly punctured.

Last dorsal of male normal, ventral segments not impressed, elytra less coarsely punctured, (fig. 10)..... **angustatus.**

Last dorsal of male tridentate, ventral segments four, five, six, distinctly impressed, elytra coarsely punctured, (fig. 11)..... **debilis.**

Sixth ventral very deeply emarginate, the angles prolonged.

The spinules bordering the entire emargination, (fig. 12)..... **repandus.**

The spinules divided into three groups, (fig. 13)..... **scrutator.**

The spinules at the tips of the processes only.

Processes of sixth ventral acute. Elytra smooth. Abdomen sub-opaque, finely and rather densely punctulate, (fig. 14)..... **mimus.**

Processes of sixth ventral obtuse. Elytra coarsely punctured. Abdomen shining, sparsely punctulate, (fig. 15)..... **addendus.**

Sixth ventral segment not pectinate posteriorly.

Form parallel, abdomen not narrowed except at tip, (fig. 16)... **parallelus.**

Abdomen gradually narrowed from base to tip.

Sixth ventral with spongy space on the face of the segment.

Abdomen rather coarsely punctured.

Elytra piceous or rufo-piceous, distinctly punctulate, (fig. 17). **nigricornis.**

Elytra luteous, scarcely visibly punctulate..... **luridus.**

Abdomen very obsoletely punctured..... **canadensis.**

Sixth ventral without spongy space on face of segment.

First two ventral segments strongly carinate at middle.

Laciniæ of last ventral long and arcuate; last dorsal acutely toothed, (fig. 18)..... **fimbriatus.**

Laciniæ shorter, straight; last dorsal with short teeth, (fig. 19). **picipes.**

First two ventral segments not or feebly carinate at middle.

Sixth ventral (sometimes fifth also), concave, emarginate posteriorly.

Posterior margin of sixth ventral emarginate at middle and at sides, (fig. 20)..... **Schwarzi.**

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* In using the above table with European works at hand, it must be remembered that Erichson, Redtenbacher, Mäklin and others, consider the last ventral as the sixth. There are seven very distinct ventral segments, the first in great part concealed. The sixth of the above table is the equivalent of the fifth of those authors.

Posterior margin emarginate at middle only.
Posterior margin plain, without spongy border at middle.
Thorax entirely testaceous.....**limbatus.**
Thorax piceous with narrow testaceous border.
Elytra scarcely visibly punctulate; laciniæ broad.
fumipennis.
Elytra distinctly punctulate; laciniæ slender.. .. ..**frigidus.**
Posterior margin of sixth ventral with a narrow spongy border at middle.
Elytra as wide or wider than long; color piceous, thorax with entire margin paler.....**Crotchii.**
Elytra longer than wide; color castaneous, thorax entirely black (except when immature).....**instabilis.**
Sixth ventral not concave nor emarginate.
Last dorsal four-dentate; elytra coarsely and irregularly punctured.
circumcinctus.
Last dorsal three-dentate; elytra coarsely and evenly punctured.
nitiduloides.

The following table applies entirely to the females of each species and is intended to be merely supplementary to the previous table, showing how in many cases the females differ considerably while the males are closely allied, and at the same time females are here approximated whose males are more widely separated above.

Last ventral entire or very nearly so, (fig. 17, c); last dorsal with the three lobes connate, (fig. 17, b).....**luridus, nigricornis, circumcinctus.**
Last ventral divided into six processes, usually long and slender.
Last dorsal deeply bilobed, (fig. 5, d).....**maculicollis.**
Last dorsal trilobed, lobes usually slender, the middle one variable, either entire, emarginate, bifid or trifid.
Middle lobe as long as the lateral, its form,
slender, with a shorter process on each side, (fig. 24).....**Crotchii.**
slender, tip either entire or very feebly notched, (fig. 25 and 11, d).
instabilis, debilis.
broader, tip notched one-third toward base, (fig. 21).....**canadensis, agilis, frigidus, nitiduloides.**
deeply divided forming two slender processes, (fig. 8, b)...**parallelus, tachyporoides, picipes, fumipennis, repandus.**
broad, tip broadly triangularly notched, (fig. 20, b).....**Schwarzi.**
Middle lobe shorter than the lateral, its form,
broadly oval, rarely with a very feeble notch at tip, (fig. 22)...**limbatus.**
broad, triangularly notched at tip, (fig. 18, c).....**fimbriatus.**
more slender, feebly notched, (fig. 7, b).....**memnonius.**
deeply divided, forming slender processes, (fig. 6, b).....**angustatus, semirufus, mimus, addendus.**

T. maculicollis, Mäklin.—Piceous, shining, entire thoracic margin and sides of elytra paler. Head black, antennæ piceous, four basal joints paler. Thorax very finely alutaceous. Elytra longer than wide, very finely alutaceous and very minutely and sparsely punctulate. Abdomen more distinctly punctulate than the elytra. Body beneath very sparsely punctured, abdomen more

distinctly. Legs pale. The sculpture of the upper surface of the thorax and abdomen consists of fine, short, transverse lines, that of the elytra resembling a cellular arrangement. Length .22—.26 inch; 5.5—6.5 mm.

Male.—Last ventral deeply cleft, forming long, slender, curved laciniæ; sixth ventral emarginate at middle the outline resembling a brace —, and with a secondary emargination external to this; posterior margin with equal spinules closely placed forming a comb-like structure. Face of segment concave with a granular space at middle divided longitudinally by a smooth line. Last dorsal segment four-dentate, teeth acute, the median somewhat longer, (fig. 5, a, b).

Female.—Last ventral six-spinous, the two central processes broader than the lateral and fimbriate at tip. Last dorsal deeply divided forming two elongate triangular processes, (fig. 5, c, d).

The sexual characters abundantly distinguish this species, superficially it resembles a number of others.

Occurs in Alaska, (Mäklin); Vancouver, (Crotch).

T. semirufus, n. sp.—Rufous, shining, elytra with darker cloud posteriorly. Head black, antennæ dark rufous, four basal joints paler. Thorax uniformly rufous. Elytra slightly longer than wide, sculpture of upper surface as in *maculicollis*. Body beneath and legs paler rufous. Length .24—.30 inch; 6—7.5 mm.

Male.—Last ventral deeply cleft, laciniæ shorter and less curved than in *maculicollis;* sixth ventral concave, the concavity densely covered with short spinous granules, hind margin sinuous with spinules on each side of middle, lateral portion of margin truncate. Last dorsal as in *maculicollis*, (fig. 6, a).

Female.—Last ventral similar to that of *maculicollis*. Last dorsal trilobed, the middle lobe shorter than the lateral and deeply divided, forming two slender processes, (fig. 6, b).

Occurs at Lake Tahoe and Gilroy (Crotch), California.

T. memnonius, Grav.—Uniformly piceous, moderately shining. Elytra slightly longer than wide, sculpture as in *maculicollis*, punctuation of elytra somewhat more evident. Underside paler than above, legs testaceous. Varies in color to picco-testaceous from immaturity. Length .22—.32 inch; 5.5—8 mm.

Male.—Last ventral as in *maculicollis;* sixth concave, the depression partially filled with spiniform granules, hind margin as in *maculicollis* but not emarginate at the sides, (fig. 7, a).

Female.—Last ventral as in *maculicollis*. Last dorsal similar to *semirufus* but with the middle lobe less deeply cleft but broader at base and the lateral lobes more slender, (fig. 7, b).

In some of the Canadian and all of the British Columbia specimens, the middle lobe of the last dorsal segment ♀ is rather more deeply cleft. This does not appear to be of specific value as the males are not distinguishable.

Occurs from Canada and New Hampshire to North Carolina, and westward to British Columbia.

T. tachyporoides, n. sp.—Piceous, shining. Antennæ half the length of body, slender, concolorous. Thorax smooth, shining. Elytra slightly longer than wide, very indistinctly alutaceous, shining. Abdomen shining, with very

few minute punctures, almost entirely smooth beneath. Length .18—.20 inch; 4.5—5 mm.

Male.—Last ventral deeply divided, lobes not divergent nor curved. Sixth ventral subtruncate feeble emargination at middle, pectinate along the margin with very short spinules forming a continuous series, a few spiniform tubercles near the posterior margin and several on the fifth ventral. Last dorsal four-dentate but with the teeth more acute than in *maculicollis*, (fig. 8, a).

Female.—Last dorsal with lateral lobes rather slender, middle lobe slender, as long as the lateral, cleft half to base, (fig. 8, b, too deeply cleft).

The facies of this species is somewhat that of Tachyporus, being more robust in body and more attenuated posteriorly than any species of Tachinus in our fauna, this together with the longer antennæ gives it a facies altogether peculiar. It is however a true member of the present genus. The color is variable, mature specimens are entirely piceous, others less mature have the thorax and elytra more or less bordered with testaceous and their legs paler.

Occurs in California, Vancouver and North Red River.

T. agilis, n. sp.—Form and sculpture of *tachyporoides*, but somewhat darker in color, legs always piceous. Length .18—.20 inch; 4.5—5 mm.

Male.—Last ventral deeply, acutely emarginate, forming broad triangular plates, sixth ventral semicircularly emarginate at middle, spinules short, arranged at each extremity of the emargination, face of segment broadly longitudinally impressed, a few granules near the emargination. Last dorsal as in *tachyporoides*, (fig. 9, a).

Female.—Last ventral with six processes, the two middle rather short and broad. Last dorsal with middle lobe as long as the outer cleft one-third to base, (fig. 9, b).

This species resembles *tachyporoides* so closely that the sexual differences of the males alone separate them. The females do not differ except slightly in color. From *angustatus* besides the sexual differences, the form of *agilis* is much more robust and convex.

Occurs in California, Crystal Springs.

T. angustatus, n. sp.—Form slender, piceous black, shining. Antennæ slender, entirely piceous. Thorax shining, with a few very minute punctures sparsely placed. Elytra slightly longer than wide, shining, obsoletely punctured. Abdomen sparsely and finely punctured, scarcely at all alutaceous. Length .20 inch; 5 mm.

Male.—Last ventral deeply divided, forming two triangular processes not curved and rather short. Sixth ventral feebly concave, broadly emarginate at middle, on each side pectinate with rather long spinules, hind margin at middle with narrow spongy space, face of segment without it. Last dorsal as in *maculicollis*, (fig. 10, a).

Female.—Last ventral as in *maculicollis*. Last dorsal with rather broad lateral lobes, middle lobe about three-fourths as long and deeply divided forming two slender processes, (fig. 10, b).

Four specimens, two ♂, one ♀ Colorado, one ♂ California.

The spinules which occur on the sixth ventral of the male are rather long and directed obliquely outward, and not as in the preceding species directly backward.

T. debilis, n. sp.—Pitchy black, sides of thorax narrowly paler. Head and thorax smooth, shining. Elytra as wide as long, moderately, densely and coarsely punctured, not alutaceous. Abdomen sparsely punctured, finely alutaceous, beneath more distinctly punctured. Legs piceous, tarsi testaceous. Antennæ piceous, apical joint paler. Length .10 inch; 2.5 mm.

Male.—Last ventral deeply, triangularly notched, forming two plates as in *angustatus*, sixth ventral broadly emarginate, the border narrowly spongy at middle and at each end spinulose, face concave, the depression extending also on the next two segments. Last dorsal tridentate, the middle tooth broad and truncate at tip, pellucid along the middle, (fig. 11, a, b).

Female.—Last ventral similar to that of *mimus* with the middle lobe somewhat broader. Last dorsal with three slender, equal processes, the middle truncate at tip, (fig. 11, c, d).

Three specimens collected by Mr. G. R. Crotch, at Crystal Springs, California, and at Vancouver.

This species resembles *nitiduloides* in form and sculpture, but the ♂ of the latter has scarcely any emargination of the sixth ventral and no depression, while the females differ still more in their sexual characters. In the specimen ♂ before me the spinules of the sixth ventral have been accidentally lost, there remain however the deep perforations in which they were inserted. A specimen in Mr. Ulke's cabinet is perfect. The last dorsal if seen by transmitted light appears quadridentate owing to the middle of the central tooth being thin and translucent.

T. repandus, n. sp.—Piceous shining, sides and base of thorax paler. Head and thorax very finely alutaceous, scarcely visibly punctulate. Elytra as broad as long, finely alutaceous, obsoletely finely punctulate. Abdomen sparsely punctulate at the sides of the penultimate dorsal, the segments all longitudinally wrinkled at middle, not alutaceous, beneath as above. Antennæ long, slender, piceous, two basal joints paler. Legs testaceous. Length .18 inch; 4.5 mm.

Male.—Last ventral as in *tachyporoides*, sixth very deeply emarginate, and on each side sinuate, the emargination entirely filled with rather long stout spinules. Last dorsal as in *tachyporoides*, (fig. 12, a).

Female.—The last dorsal is deeply divided into four slender processes, (fig. 12, b).

This species greatly resembles *scrutator* but is darker in color and with different sexual characters The spinules in the emargination of the sixth ventral are comparatively long and stout; there is also a depression of the face of the segment close to the margin but no evidence of granules.

Three ♂, one ♀, Louisiana, Ulke; Michigan and Trenton Falls, New York, Dr. Schwarz.

T. scrutator, Horn.—Pale piceo-testaceous, shining. Head black, very finely alutaceous. Thorax testaceous, smooth, shining, apical region somewhat darker in color. Elytra piceo-testaceous, smooth, shining. Abdomen similar in color, apical margins of segments paler, surface smooth, without sculpture, beneath as above. Legs testaceous. Antennæ piceous, two basal joints paler. Length .14 inch; 3.5 mm.

Male.—Last ventral as in *tachyporoides*, sixth ventral deeply emarginate at middle, on each side sinuate, spinules arranged in three groups, one at each end of the emargination, the other at its bottom. Last dorsal as in *tachyporoides*, (fig. 13).

Female.—Unknown.

The color as above described accords with that given by Melsheimer, (*T. discoideus* || Mels. Proc. Acad. 1844, p. 32), but is probably subject to variation and may become more or less piceous. The size given is smaller than Melsheimer's, and there may even be some doubt as to the correctness of the identification, but I can find no species to which the description can be better applied. This species has been placed in Leucoparyphus in all recent publications, but the anterior tarsi of the male are dilated and the mesosternum not carinate.

One male, Illinois.

T. mimus, n. sp.—Piceous shining, sides of thorax somewhat paler. Head and thorax very minutely punctulate and scarcely perceptibly alutaceous. Elytra as broad as long, distinctly alutaceous. Abdomen above and beneath rather densely punctulate, finely pubescent, subopaque. Legs rufo-piceous, tarsi paler. Antennæ long, black, two basal joints paler. Length .16 inch; 4 mm.

Male.—Last ventral deeply and acutely notched as in *angustatus*, sixth ventral very deeply emarginate, prolonged on each side of the emargination, and laterally with a sinuation, spinules arranged on the tips of the prolongation; lower face of segment distinctly concave with a granular space distant from the margin in form of a hoof. Last dorsal quadridentate, the middle teeth somewhat longer, (fig. 14, a).

Female.—Last ventral with the middle processes united, forming one obtuse lobe, lateral processes slender. Last dorsal with the middle lobe deeply bifurcate, shorter than the outer lobes, the latter broader, as in *semirufus*, (fig. 14, b).

Two specimens from Oregon have been given me by Mr. H. Ulke, another pair remains in his cabinet.

T. addendus, n. sp.—Piceous, shining, sides of thorax and elytra paler, legs testaceous. Head black, shining, extremely finely alutaceous and minutely punctulate. Antennæ black, four basal joints piceo-testaceous. Thorax piceous, sides and base paler, sparsely finely punctulate. Elytra piceous, humeral space and narrow margin at the sides paler, rather coarsely punctulate. Abdomen piceous, posterior margins of segments paler, surface sparsely finely punctulate. Body beneath piceous, abdomen sparsely punctulate. Legs rufo-testaceous. Length .16 inch; 4 mm.

Male.—Sixth ventral very deeply and suddenly emarginate, the angles of the emargination prolonged, obtuse and spinulose, face of segment impressed, with

numerous granules. Last ventral deeply triangularly notched as in *mimus*. Last dorsal normally quadridentate, (fig. 15, a).

Female.—Last ventral with the usual six processes the two central broader and fimbriate. Last dorsal with the middle lobe slightly shorter than the outer, deeply divided into two slender processes, (fig. 15, b).

The characters given in the table will at once enable this species to be known.

Two specimens kindly sent me by Dr. E. A. Schwarz, collected at Bachewauung Bay, Lake Superior.

T. parallelus, n. sp.—Form parallel, color piceous, thorax, elytra, antennæ and legs rufous. Head black, smooth, shining, a faint vertical fovea. Thorax rufous, shining, finely alutaceous and very minutely sparsely punctured. Elytra slightly longer than wide, rufous, hind margin slightly darker, surface faintly sulcate, finely alutaceous and rather coarsely but sparsely punctured. Abdomen piceous, hind margins of segments paler, surface very minutely alutaceous and finely and sparsely punctured. Legs rufous. Length .24—.26 inch; 6—6.5 mm.

Male.—Last ventral deeply divided, laciniæ stout but arcuate; sixth ventral scarcely at all concave, broadly emarginate, without spinules or spongy space. Last dorsal four-dentate the lateral teeth short obtuse, (fig. 16, a).

Female.—Last ventral as in *maculicollis* but with the middle lobes rather broader. Last dorsal with the lateral lobes rather stout and sinuate near the tip, middle lobe slightly longer than the outer lobes and divided to the base in two slender processes, (fig. 16, b).

This species is of more parallel form than any other in our fauna, and its facies is that of Olisthaerus but more convex.

Occurs in Illinois and Canada.

T. nigricornis, Mann.—Black, shining, elytra dark-brown, legs piceo-testaceous. Head and thorax black, minutely and sparsely punctulate and obsoletely alutaceous. Elytra slightly longer than wide, distinctly punctulate, obsoletely alutaceous and with two rows of distant and larger but obsolete punctures. Abdomen finely alutaceous, sparsely punctured more densely at base, beneath more coarsely punctured. Antennæ piceous. Length .24—.26 inch; 6—6.5 mm.

Male.—Last ventral deeply divided forming two triangular processes not curved nor slender. Sixth ventral emarginate at middle, not pectinate, at middle concave, the concavity entirely filled with acute granules. Last dorsal as in *maculicollis*, (fig. 17, a).

Female.—Last ventral entire middle lobe fimbriate, lateral processes indicated by small teeth only. Last dorsal entire, trilobed, lobes united, the middle longer and acute, (fig. 17, b, c).

Occurs from Alaska to Vancouver.

T. luridus, Erichson.—Piceous, shining, elytra pale luteous, legs testaceous, antennæ ferruginous, basal joints paler. Head and thorax black, sculptured as in *nigricornis*. Elytra not longer than wide, very minutely punctulate. Abdomen more finely punctured than *nigricornis*, but beneath similarly. Length .24 inch; 6 mm.

Male.—As in *nigricornis*, with the granular space on the face of the sixth segment more irregular.

Female.—As in *nigricornis.*

By description this and the preceding species are very closely allied, they differ however in the former having a different color and elytral sculpture, the elytra longer and the spongy or granular space on the ♂ sixth segment in form of a hoof and in the present species very irregular.

Occurs from Canada to Georgia.

T. canadensis, n. sp.—Piceous, thorax at sides, elytra at base broadly, sides and apex narrowly, testaceous. Legs testaceous. Antennæ ferruginous, four basal joints paler. Head black, finely alutaceous, sparsely punctulate. Thorax very finely alutaceous. Elytra distinctly longer than wide, finely alutaceous, sparsely punctulate. Abdomen similarly sculptured, beneath smoother, scarcely punctulate. Length .22—.24 inch; 5.5—6 mm.

Male.—As in *nigricornis.*

Female.—Last ventral as in *maculicollis.* Last dorsal trilobed, the lobes equal, the middle slightly bifid at tip, (fig. 21).

This species is one of those in which the one sex closely resembles in its characters an adjacent species, while the other sex presents widely different characters from the corresponding sex of that species.

Occurs in Illinois and Canada.

T. fimbriatus, Grav.—Piceous, elytra pale castaneous, tip narrowly piceous. Antennæ black, four basal and the last joint pale. Head and thorax black, very minutely punctulate and very finely alutaceous. Elytra as wide as long, minutely alutaceous, rather coarsely sub-striato-punctate. Abdomen shining, sparsely punctulate, beneath rather more coarsely punctulate. Legs piceous or piceo-rufous. Length .28—.36 inch; 7—9 mm.

Male.—Last ventral deeply divided forming long, slender, curved laciniæ; sixth broadly emarginate at middle, the centre of the emargination narrowly bordered with granules, face concave. Metasternum frequently elevated in a crest posteriorly. Inner angle of posterior coxæ often toothed, (fig. 18, a, b).

Female.—Last ventral as in *maculicollis* but with the two median processes more slender. Last dorsal trilobed, the outer lobes slender, the middle broader and shorter and triangularly notched at tip, (fig. 18, c).

In both sexes the first two ventral segments are carinate at middle.

Occurs from Canada to North Carolina.

T. picipes, Erichson.—Uniformly piceous, moderately shining. Antennæ with the four basal and the apical joint paler. Head and thorax very minutely punctulate and finely alutaceous, the latter with a feeble trace of median impressed line. Elytra as broad as long, sparsely punctured and finely alutaceous. Abdomen finely punctured and alutaceous, beneath more evidently punctured than above. Length .28—.32 inch; 7—8 mm.

Male.—As in *fimbriatus* with the laciniæ nearly straight, (fig. 19, a).

Female.—Last ventral as in *fimbriatus;* last dorsal as in *parallelus,* (fig. 19, b).

As in the preceding species the first two ventral segments are carinate at middle.

Occurs from Canada to Virginia.

T. Schwarzi, n. sp.—Piceous black, shining. Antennæ as in *picipes*. Head and thorax extremely finely alutaceous. Elytra slightly longer than wide, obsoletely subsulcate, sparsely but very distinctly punctured, minutely alutaceous. Abdomen minutely punctured, scarcely visibly alutaceous, beneath more distinctly punctured. Length .32 inch; 8 mm.

Male.—As in *picipes*, (fig. 20, a).

Female.—Last ventral as in *fimbriatus*, last dorsal with the middle lobe broader than the lateral, as long, tip triangularly notched, (fig. 20, b).

This species is one of the discoveries of Dr. E. A. Schwarz, of Detroit. It has no carination of the first two ventral segments.

Occurs near Detroit, Michigan.

T. limbatus, Mels.—Pale testaceous, very shining, elytra piceous with broad lateral and narrow apical margin pale. Antennæ rufous, four basal and two terminal joints paler. Head black, with few minute punctures. Thorax testaceous, smooth. Elytra as broad as long, sparsely punctured, minutely alutaceous. Body beneath more distinctly punctured. Length .28—.30 inch; 7—7.5 mm.

Male.—Laciniæ of last ventral short and broad as in *luridus*, sixth ventral emarginate at middle, a narrow granular margin at middle, face concave, last dorsal as in *maculicollis*.

Female.—Last ventral as in *maculicollis*. Last dorsal with the outer lobes slender, middle lobe short, broad, and oval, sometimes pointed at tip and with the tip very finely bifid, (fig. 22).

This species occurs especially in the Middle States.

T. fumipennis, Say.—Piceous, shining, sides of thorax, basal and apical margins of elytra and apical margins of abdominal segments testaceous. Antennæ piceous, two basal joints paler. Head and thorax minutely punctulate, finely alutaceous, the thorax with sides broadly, the apex and base narrowly testaceous. Elytra not longer than wide, sculptured as the thorax, piceous, humeral spot and basal band broader at middle and apex narrowly, testaceous. Abdomen more distinctly punctured than the thorax, apical margins of segments paler, beneath sculptured as above. Legs testaceous. Length .24—.30 inch; 6—7.5 mm.

Male.—As in *limbatus*, the granular margin however barely visible.

Female.—Last ventral as in *maculicollis*, last dorsal as in *parallelus*.

There is no difficulty in distinguishing this species excepting possibly from *frigidus*, from this the general arrangement of color must be the guide, together with a more distinct punctuation of the latter. From *Crotchii* and *instabilis* the female last dorsal is the best distinction.

Occurs from Pennsylvania to Florida.*

* While reading the proof of the above I have received the Canad. Ent. May, 1877, and find some remarks on this species by Mr. Austin. By his courtesy

T. frigidus, Erichs.—Piceous black, shining, margin of thorax, base and sides of elytra and four basal joints of antennæ rufo-testaceous. Head and thorax minutely punctulate, finely alutaceous. Elytra slightly longer than wide, finely punctured, minutely alutaceous. Abdomen more finely punctured than the thorax, finely alutaceous. Length .20—.24 inch; 5—6 mm.

Male.—Laciniæ of last ventral slender, not elongate, feebly curved, sixth ventral feebly emarginate without granular margin at middle. Last dorsal as in *maculicollis.*

Female.—Last ventral as in *maculicollis.* Last dorsal with lateral lobes slender median broader, as long as the lateral, broad at base narrow at tip and rather deeply cleft, (fig. 23).

This species resembles *canadensis* but is distinguished by the characters peculiar to each sex. In the females there is a tendency in the middle lobe of the last dorsal to become more deeply cleft and the processes rather more divergent.

Occurs from Pennsylvania to Canada, Alaska and California, and has been erroneously considered as *luridus* in collections.

T. Crotchii, n. sp.—This species resembles *frigidus* so closely that no further description is necessary, it is however usually somewhat larger. Length .24—.26 inch; 6—6.5 mm.

Male.—As in *frigidus.*

Female.—Last ventral as in *frigidus,* laciniæ somewhat stouter, sixth ventral with narrow spongy border at middle. Last dorsal with the outer lobes slender, middle lobe as long, broad at base, tip acute, on each side a slender acute process, (fig. 24).

Collected by G. R. Crotch in Vancouver.

T. instabilis, Mäklin.—Pitchy black, moderately shining, elytra dark castaneous. Antennæ piceous. Head and thorax black, the latter with the sides rarely slightly paler, surface sparsely punctulate and obsoletely alutaceous. Elytra distinctly longer than wide, finely punctate and alutaceous. Abdomen similarly but less distinctly sculptured. Legs picco-testaceous. Length .22—.24 inch; 5.5—6 mm.

Male.—Similar to *nigricornis,* without granular space on the face of segment but a narrow border at middle of emargination.

Female.—Last ventral as in *memnonius.* Last dorsal with three slender equal processes, the middle sometimes feebly cleft at tip, (fig. 25).

The males of this species resemble closely *nigricornis,* the females are easily known.

I had the privilege of examining the types of his remarks and find that his *fumipennis* and *axillaris* are but slight variations of the same species. Mr. Austin is mistaken in intimating that Say described "several allied species." *T. colonus,* Suchse, is by no means distinct from the above. The entire difficulty has arisen, it appears to me, from having ♀ *frigidus* mixed with *fumipennis,* as the former was unknown to Mr. A. at the time the paper was written. The number of impressed segments of the abdomen is not a specific character as may be demonstrated by any six ♂ specimens of *frigidus.*

I am inclined to place with this species *apterus*, Mäkl., described from a mutilated female, it appears to be very similar to the present species and differs only in having the middle process of last dorsal shorter, which may be due to accident.

Occurs in Alaska and California.

T. circumcinctus, Mäkl.—Piceous black, shining, elytra castaneous or dark luteous, apical margin darker. Head and thorax black, very minutely punctulate and finely alutaceous. Antennæ piceous. Elytra as long as wide, rather coarsely punctured, shining, not visibly alutaceous. Abdomen rather sparsely, coarsely punctulate, distinctly alutaceous. Legs piceo-testaceous. Length .16—.20 inch; 4—5 mm.

Male.—Last ventral similar to *nigricornis*, sixth scarcely emarginate at middle, a narrow spongy space on the margin, face not concave. Last dorsal normally quadridentate.

Female.—Last ventral with the middle lobes short and broad, lateral process very short, reduced to mere dentations. Last dorsal with the three lobes approximated and connate, the middle emarginate at tip, (fig. 26, a, b).

Occurs in Canada, Michigan, Kansas, Vancouver, Alaska.

T. nitiduloides, n. sp.—Pitchy black, sides of thorax and tip of elytra paler. Head and thorax minutely punctulate, not alutaceous. Elytra as wide as long, rather coarsely, deeply and regularly punctate. Abdomen sparsely punctulate, distinctly alutaceous. Legs piceous. Length .12 inch; 3 mm.

Male.—Ventral characters as in *circumcinctus*. Last dorsal tridentate. The usual middle teeth united forming one.

Female.—Last ventral as in *maculicollis*, last dorsal as in *frigidus*.

This species is relatively broader than any other in our fauna, and resembles a Carpophilus at first glance.

Occurs from Canada to Maryland.

T. elongatus, Gyll.—In addition to the above-mentioned, Mannerheim (Bull. Mosc. 1843, II, p. 227), quotes this species as having occurred in Alaska. I have been entirely unable to identify any of ours with it.

TACHYPORUS Grav.

The species of this genus resemble each other so closely that it is only with great difficulty that they can be described, so that their feeble differences may be made apparent. There are no variations of sexual characters that can be made available nor is the sculpture very different. The coloration is variable to a certain extent but appears to be the best means of formulating the species. The sexual characters are as follows:

Male.—Anterior tarsi distinctly dilated. Sixth ventral segment triangularly emarginate, seventh elongate oval. Last dorsal with entire margin.

Female.—Anterior tarsi very feebly or not dilated. Last ventral semicircular. Last dorsal with four equal acute teeth.

The following table is the best I can devise for the species:

Form convex and more robust.
Color rufo- or piceo-testaceous. Elytra uniform or maculate.
Elytra at sides and oblique discal spot on each black.....**maculipennis.**
Elytra uniform in color or merely darker around the scutellum.
Abdomen bright rufo-testaceous, last two segments black.....**elegans.**
Abdomen uniform piceous or piceo-testaceous.
Thorax and elytra very much paler than abdomen.
Thorax not broader than elytra, rapidly narrower to apex...**jocosus.**
Thorax broader than the elytra, sides strongly arcuate.
chrysomelinus.
Body above uniform in color, piceous.....**californicus.**
Color pitchy black, apex of elytra paler.
Form convex, femora and coxæ piceous.....**nanus.**
Form sub-depressed, legs testaceous.....**scitulus.**
Form depressed, slender. Penultimate joint of maxillary palpi stouter.
brunneus.

T. maculipennis, Lec.—Piceo-testaceous, shining, convex. Head smooth, black, shining. Antennæ testaceous, as long as head and thorax. Thorax testaceous, smooth, shining, nearly twice as wide as long, not wider than the elytra, sides arcuate and gradually narrowed to apex, hind angles broadly rounded. Scutellum piceous. Elytra conjointly wider than long and slightly longer than the thorax, tips conjointly feebly emarginate, disc shining, very sparsely and minutely punctulate, sparsely pubescent, color testaceous, a spot near the side margin and one oblique, on the middle of each elytron black. Abdomen piceous, hind margins of each segment paler, sparsely punctulate and pubescent. Body beneath piceous, abdomen more distinctly punctured than above. Legs testaceous, anterior coxæ very slightly darker. Length .14—.16 inch; 3.5—4 mm.

In form this species resembles *chrysomelinus*, Linn., but the thorax is less broad. The ornamentation of the elytra resembles somewhat that of *Cilea silphoides*.

Appears to be very widely distributed, Michigan to Georgia, Middle States to Kansas.

T. elegans, n. sp.—Bright rufo-testaceous, head, last two segments of abdomen, and scutellar spot black. Antennæ slightly longer than the head and thorax pale testaceous. Thorax as in the preceding. Elytra rufo-testaceous, paler than the abdomen, a circum scutellar spot piceous, surface distinctly punctulate, sparsely pubescent. Abdomen bright rufo-testaceous, last two segments black, surface sparsely punctulate and pubescent. Body beneath rufo-testaceous. abdomen more distinctly punctured than above. Legs pale testaceous. Length .14 inch; 3.5 mm.

This species resembles *jocosus* in form. Differs remarkably from all our species in its coloration and resembles in this respect *obtusus*,

of Europe, in which the body beneath is piceous and the elytra at base broadly black.

One specimen ♀, Canada, Pettit.

T. jocosus, Say.—Piceous shining, thorax, elytra and legs rufo-testaceous. Head black, shining, antennæ testaceous, outer joints darker. Thorax not wider than the elytra, smooth, shining, twice as wide as long, sides rapidly narrowing to apex, hind angles rounded. Elytra very nearly as long as wide, conjointly feebly emarginate, surface sparsely punctulate and pubescent, color rufo-testaceous, rarely with a lateral and circum-scutellar darker space. Abdomen piceous, apical margins of the segments paler, surface sparsely punctulate and pubescent. Body beneath piceous, abdomen more distinctly punctured than above. Legs, coxæ and prothorax testaceous. Length .16 inch; 4 mm.

This species is also widely distributed like *maculipennis*. It can only be confounded with *chrysomelinus* which is rather more robust in form and the thorax distinctly broader than the elytra.

The lateral and basal spots are very often entirely wanting.

T. chrysomelinus, Linn.—Piceous shining, thorax, elytra and legs, rufo-testaceous. Head black, shining, antennæ testaceous, outer joints somewhat darker. Thorax not twice as wide as long, broader than the base of the elytra, sides strongly arcuate, surface smooth, shining. Elytra as in *jocosus*. Abdomen, body beneath and legs as in *jocosus*. Length .16 inch; 4 mm.

This species is somewhat variable; first, the typical form as described, (occurring in Canada); second, *maculicollis*, Lec., with a poorly defined darker thoracic space; third, *acaudus*, Say, smaller in size with the abdomen much retracted. The latter character will strike any student of the family as one of no value whatever. I have endeavored to find other characters affording sufficient basis for the separation of these as distinct species but without avail, the differences between this and *jocosus* being slight enough.

Same distribution as *maculipennis*.

T. californicus, n. sp.—Color above entirely piceous in maturity. Head black, antennæ piceous, paler at base. Thorax as in *jocosus*, sides slightly more arcuate. Elytra piceo-castaneous, sparsely punctulate and pubescent, form of *jocosus*. Body beneath piceous, abdomen above and beneath, sparsely and finely punctulate. Legs and coxæ rufo-piceous. Length .16 inch; 4 mm.

The color of this species may vary from immaturity so that the entire thoracic margin and the sides and apex of the elytra are paler, in this case the abdomen also becomes equally paler so that the uniformity of color of the body is preserved.

Occurs everywhere on the Pacific Coast from Oregon to the Peninsula of California.

T. manus, Er.—Pitchy black, apical third of elytra rufo-testaceous. Head black, antennæ piceous, basal joints paler. Thorax slightly broader than the elytra, pitchy black, sides and base narrowly paler. Elytra similar in form to *chrysomelinus* but more distinctly punctured. Body beneath, femora and coxæ pitchy black, tibiæ and tarsi piceo-testaceous. Length .12—.14 inch; 3—3.5 mm.

By its color this is one of the most distinct species in our fauna.

Occurs from Canada to Pennsylvania.

T. scitulus, Er.—Pitchy black, shining, apices of elytra testaceous. Head black, antennæ rufo-testaceous. Thorax slightly broader than the elytra, pitchy black, lateral and apical margins narrowly paler. Elytra very slightly broader than long, apical margin testaceous, a piceous spot at humerus, surface distinctly punctulate, sparsely pubescent. Abdomen piceous, sparsely punctulate and pubescent. Body beneath piceous. Legs testaceous, anterior coxæ darker. Length .10 inch; 2.5 mm.

One specimen from Louisiana is referred to this species. In form it resembles *brunneus* but is less depressed and the third joint of the maxillary palpi is less dilated.

T. brunneus, Fab.—Rufo-testaceous, form depressed, elongate. Head piceous, antennæ testaceous. Thorax twice as wide as long, not wider than the elytra, sides gradually narrowing to apex. Elytra as wide as long, sparsely punctulate and pubescent. Abdomen slightly darker than the elytra, similarly punctured. Body beneath rufo-testaceous, metasternum somewhat darker. Legs and coxæ testaceous. Length .10—.12 inch; 2.5—3 mm.

It may easily be noticed that the penultimate joint of the maxillary palpi is more inflated than in any other of the genus.

Occurs over our entire country including California, is also common in Europe and Northern Africa. Probably cosmopolitan.

CILEA Duval.

Owing to the discovery of several new Tachinus with characters slightly at variance with the majority of the species, the differences between these two genera seem to be narrowed down to a slight carination of the mesosternum between the coxæ, and the tarsi simple in both sexes. The first joint of the hind tarsus is, it is true, nearly as long as the three following united, but in *Tachinus tachyporoides* the same joint is very nearly as elongated. Cilea has priority over Leucoparyphus.

One species only is known in our fauna occurring especially in the Northern States and common in the greater part of Europe. *L. discoideus* (Mels.), Lec., should be placed in Tachinus, the mesosternum being simple and the anterior tarsi dilated in the male.

C. silphoides, Linn.—Piceous black, shining, thorax broadly testaceous at the sides, elytra with humeral spot, apical margin and suture testaceous. Antennæ piceous, two basal joints paler. Head and thorax very finely alutaceous. Elytra obsoletely punctulate, not alutaceous; humeral spot usually small, apical testaceous margin wider externally, the sutural wider at each extremity. Abdomen above punctured and more distinctly alutaceous than the thorax, beneath finely punctulate and alutaceous at the sides. Legs pale testaceous. Length .10 inch; 2.5 mm.

Male.—Last ventral deeply notched, forming two triangular plates, sixth ventral deeply notched at middle on each side of the notch a strong angulation beyond which the margin is very oblique. Last dorsal with four slender teeth the two median longer and more acute, (fig. 27, a, b).

Female.—Last ventral with four slender processes, the two median somewhat broader and longer. Last dorsal with four slender processes nearly equal in length and similar in form, (fig. 27, c).

In addition to the processes described for both sexes there are on each side two others which *seem* to belong to the last dorsal and ventral respectively. These are merely portions of the genital arrangement.

PHYSETOPORUS n. g.

Form robust as in *Conosoma*. Mentum transverse, narrower in front, ligula dilated at apex deeply notched. Last joint of maxillary palpi slender as in *Tachinus*, twice as long as the preceding joint. Antennæ slightly longer than head and thorax, joints longer than wide. Mesosternum strongly cristate. Hind tarsi with joints one to four gradually decreasing in length. Anterior tarsi dilated in the males. Abdomen feebly margined.

The above genus, proposed for *Coproporus grossulus*, Lec., seems intermediate between *Tachinus* and *Erchomus*. With the former it agrees in the structure of the antennæ, palpi and ♂ tarsi, with the latter it is allied by the structure of the mesosternum although instead of being simply slightly carinate there is a very strong crest or plate as in many Hydrophilidæ.

P. grossulus, (Lec.)—Robust, convex, black, shining. Antennæ piceous four basal joints paler. Head and thorax very minutely punctulate and very finely alutaceous. Elytra conjointly broader than long, narrower posteriorly and emarginate at tip, surface more distinctly punctulate and alutaceous with the strigosity oblique. Abdomen more densely punctulate and alutaceous, beneath more distinctly punctulate. Legs pale testaceous. Length .16—.18 inch; 4—4.5 mm.

Male.—Last ventral deeply triangularly notched, sixth trisinuate at apex and finely fimbriate at middle. Last dorsal acutely quadridentate, teeth similar and equal.

Female.—Last ventral deeply divided into six slender and acute processes, the four middle processes equal, the lateral shorter. Last dorsal trilobed as in *Tachinus*, the middle lobe broader than the outer but shorter and deeply divided into two slender processes.

The male has the anterior tarsi as broadly dilated as in any *Tachinus*. The genital apparatus is also provided with two long, slender, falciform processes which greatly resemble the laciniæ formed by the deep division of the seventh ventral segment of *Tach. memnonius* and others.

Occurs not rarely in the decaying stems of various Cactaceæ in Arizona.

ERCHOMUS Motsch.

The species of this genus were placed originally by Erichson as a group of *Tachinus* characterized by the carinate mesosternum and the simple anterior tarsi of the male. These have justly been considered to have generic value and the group has consequently been known as *Coproporus*, Kraatz, (1859), although Motschulsky's name has one year priority.

The species may be separated in the following manner:

Elytra distinctly punctulate.
  Last ventral ♂ triangularly notched.
    Thorax not visibly punctulate, elytra distinctly alutaceous.....**inflatus.**
    Thorax distinctly punctulate, elytra not alutaceous.....**punctipennis.**
  Last ventral ♂ semicircularly notched.
    Thorax minutely punctulate, elytra not alutaceous.....**ventriculus.**
Elytra smooth, not punctulate.
  Last ventral ♂ triangularly notched.....**lævis.**

E. inflatus, (Fauvel mss.) n. sp.—Pitchy black, shining. Antennæ rufo-piceous, four basal joints paler. Head black, extremely finely alutaceous. Thorax similarly sculptured. Elytra conjointly broader than long, gradually narrower from base and emarginate at middle, surface finely punctulate and alutaceous. Abdomen sparsely punctulate and finely alutaceous, beneath more distinctly punctulate. Legs rufo-testaceous. Length .12—.14 inch; 3—3.5 mm.

Male.—Last ventral deeply triangularly notched at middle. Last dorsal quadridentate, the teeth slender and acute, the two middle longer.

Female.—Last ventral divided into six slender processes, the outer very short, the middle longer. Last dorsal with four slender acute processes, the middle longer.

This species is much larger than the others of the genus and broader and at the same time rather more depressed.

Occurs under decaying Cactus at Camp Grant, Arizona.

E. punctipennis, Lec.—Black, shining. Head and thorax minutely punctulate, very indistinctly alutaceous. Elytra distinctly punctulate, not alutaceous, obsoletely longitudinally strigose. Abdomen minutely punctulate, obsoletely alutaceous. Legs piceo-rufous. Length .10 inch; 2.5 mm.

Male.—Last ventral broadly triangularly emarginate. Last dorsal quadridentate, middle teeth longer, (fig. 28).

Female.—Last ventral very like *Tachinus angustatus;* last dorsal as in the male.

Closely resembles *ventriculus* and is distinguished by the sexual characters of the male only, the characters of sculpture and color are evanescent.

Occurs at Camp Grant, Arizona, under Cottonwood bark.

E. ventriculus, Say.—The description of the preceding species applies equally well to this. The only permanent difference being in the male sexual characters as shown in the table. I do not notice the fine longitudinal striæ on the elytra of the specimens before me, they are however very feeble in the preceding.

Male.—Last ventral semicircularly emarginate at middle. Last dorsal as in *punctipennis*, (fig. 29).

Female.—As in *punctipennis.*

Occurs everywhere east of the Rocky Mountains, and varies in color from varying degrees of maturity.

E. lævis, Lec.

This also agrees with *punctipennis* in all its characters, sexual and otherwise, except that the head, thorax and elytra, are entirely smooth and devoid of sculpture.

Occurs in the Gulf States.

CONOSOMA Kraatz.

This genus is especially distinguished from all others of the group by the immarginate abdomen, the other characters being those of *Tachyporus.*

In the endeavor to find some rational basis for the separation of the species some hitherto unobserved characters have been noticed. The feeble carination of the mesosternum has already been mentioned by Erichson as occurring in several species, in these the mesosternum is merely obtusely elevated without acute summit, and the body is more depressed in form. One species only has on each elytron a marginal row of setigerous punctures. Those in which the elytra are red at base have long rather stout setæ arising from punctures at the sides of the abdominal segments, the unicolored species have short hairs merely which might readily escape notice. The anterior and posterior tibiæ have each one terminal spur, slender and delicate, and very short on the anterior tibiæ. The middle tibiæ may have either one or, as in the majority, two spurs. The tips of the middle and hind tibiæ are fimbriate with short equal spinules which in one species ascend a short distance along the inner margin of the tibiæ as is seen in many Curculionidæ. On the outer side of each femur near the knee there is always a moderately long stiff, bristly hair directed downwards and in those species with but one middle tibial spur there

are three bristles, one long and two much shorter, so that without being able to observe the spurs on the middle tibiæ, the fact of the occurrence of one bristle near the tip of the femur indicates two tibial spurs, while three bristles indicate one spur.

The above-mentioned characters have been made use of in the arrangement of our species in the manner shown in the following table:

Mesosternum obtusely elevated. Body subdepressed.
  Thorax piceous, hind angles rufo-testaceous.....**littoreum.**
  Thorax testaceous, apical third or half piceous.....**Knoxii.**
Mesosternum distinctly carinate. Body robust.
  Middle tibiæ with one terminal spur only.
    Elytra unicolored or feebly paler along the base; spinules of the tip of middle tibiæ ascending, (fig. 33).....**crassum.**
    Elytra with well-defined red spot on each; spinules of middle tibiæ terminal only.....**bisignatum.**
  Middle tibiæ with two distinct terminal spurs, (fig. 34).
    Elytra without setigerous punctures.
      Abdominal segments without long setæ at the sides.
        Elytra densely punctulate. Species of moderate size.
          Elytra broader than long. Color of body pale castaneous. Hind angles of thorax subacute.....**castaneum.**
          Elytra as long as wide. Color piceous. Hind angles obtuse. **pubescens.**
        Elytra very sparsely punctulate. Species very small.....**parvulum.**
      Abdominal segments with long setæ at the sides, arising from rather large deep punctures.
        Thorax finely punctulate merely.....**basale.**
        Thorax finely punctulate and alutaceous.....**opicum.**
    Elytra with a row of setigerous punctures near the margin.
      Abdomen setose at the sides.....**scriptum.**

It sometimes happens that the setæ of the abdominal segments are removed by abrasion, but the large punctures from which they arise may be seen so that the presence of the one is an indication of the other.

C. littoreum, Linn.—Subdepressed, brownish, subopaque, clothed with fine sericeous pubescence. Head piceous, finely and sparsely punctulate. Antennæ pale brownish, four basal and two apical joints paler. Thorax brownish, hind angles broadly rufo-testaceous, broader than the elytra, hind angles subacute, surface moderately densely and finely punctulate and pubescent and under high power distinctly alutaceous. Elytra longer than wide, slightly narrower at apex, color brownish opaque, a large basal spot, testaceous on each elytron, surface densely and very finely punctulate and with brown silken pubescence. Abdomen piceous, hind margins of each segment paler, surface less densely punctured and pubescent than the elytra. Body beneath piceous, legs and coxæ testaceous. Length .14—.16 inch; 3.5—4 mm.

Massachusetts and Canada.

C. Knoxii, Lec.—Resembles *littoreum* in form, differs especially in coloration as follows: Thorax testaceous, apical third or even half piceous. Elytra testaceous, lateral margin narrowly, apical broadly piceous. Abdomen rufo-testaceous, last three segments black. Body beneath piceous, abdomen beneath as above. Legs and coxæ testaceous. Length .12—.14 inch; 3—3.5 mm.

The elytral margin at base has a very narrow piceous border which rapidly becomes wider passing in a curved line to near the middle of the suture. It is barely possible that this may be merely a variety of the preceding. In both species there are two middle tibial spurs, one femoral seta, and the last three segments of the abdomen are alone setigerous.

Occurs in Western Pennsylvania and Michigan.

C. crassum, Grav.—Pitchy black, robust, surface finely clothed with pale brownish pubescence. Antennæ as long as the head and thorax, brownish testaceous, apical joint paler. Head piceous, mouth paler, very sparsely punctulate. Thorax convex, sparsely pubescent and very finely and sparsely punctulate, sides regularly arcuate, base subsinuate on each side, hind angles broadly rounded. Elytra as long as wide, slightly narrower at apex, base indistinctly paler, surface densely and finely punctulate and sparsely pubescent. Abdomen setigerous at the sides, sparsely punctured but more coarsely than the elytra, sparsely pubescent, beneath as above. Body beneath piceo-rufous, sparsely pubescent. Legs paler. Length .14—.22 inch; 3.5—5.5 mm.

This species is the largest and most robust in form. When mature it is entirely unicolored above, when less mature the bases of thorax and elytra are more or less reddish. In both sexes of this species the middle and hind femora have three unequal bristles near the tip and at the tip of the middle tibia the spinules ascend along the inner edge. There is also but one spur, (fig. 33).

This species occurs from Canada to the Gulf States.

C. bisignatum, n. sp.—Black, shining, elytra with a well-defined subbasal red spot on each. Legs rufous. Antennæ black, apical and three basal joints testaceous. Abdomen black, posterior margins of segments paler. Length .14—.18 inch; 3.5—4.5 mm.

The form is precisely that of *crassum*, the sculpture of the elytra however a little finer and more dense. The abdominal segments have bristles at the sides. The middle femora have three unequal bristles and the posterior, one near the tip. The middle tibiæ have the tips fimbriate with spinules which do not ascend as in *crassum*, and there appears to be but one terminal spur. The two specimens before me are in very fair condition but it is barely possible that there are normally two middle tibial spurs, in which case the species should be placed near *basale* from which the larger size and well-defined subbasal red spot will distinguish it.

Two specimens, Santa Barbara and Wilmington, Cal., G. R. Crotch.

C. castaneum, n. sp.—Castaneous varying to brownish, moderately shining, form rather elongate, sparsely clothed with silken pubescence. Antennæ testaceous, attaining the hind angle of thorax. Head and thorax very minutely punctulate. Thorax not wider than the elytra, sides moderately arcuate and regularly narrowed from base to apex, base slightly sinuate, hind angles rectangular. Elytra slightly wider than long and narrower at apex, surface moderately densely and minutely punctulate, punctures arranged in distinct transverse strigæ. Abdomen not setose at the sides except the last segment, surface more densely punctulate than the elytra. Body beneath colored as above, legs somewhat paler. Length .16 inch; 4 mm.

Two specimens were collected by Mr. G. R. Crotch near Santa Barbara, of darker color than those collected by me at Tejon. By a close examination of the characters I cannot find any distinction. There is also a specimen collected by Dr. Zimmerman in South Carolina, not differing except in its smaller size.

Not rare at Fort Tejon, California, in fungi.

C. pubescens, Payk.—Dark brown, basal region of elytra sometimes slightly paler. Legs rufo-testaceous. Thorax truncate at base, hind angles obtusely rounded, slightly broader than the elytra. Elytra slightly longer than wide. Length .16 inch; 4 mm.

This species agrees with the preceding in all its characters except those mentioned above. It has been distributed under the names *adeps*, Zimm., and *angustulus*, Fauvel, these representing respectively the retracted and elongate forms.

New York to Louisiana.

C. parvulum, n. sp.—Rufo-piceous, moderately shining, subdepressed. Head and thorax very sparsely and finely punctured, sparsely pubescent. Thorax slightly wider than the thorax, sides regularly arcuate, base feebly sinuate on each side, hind angles obtusely rectangular. Elytra distinctly wider than long, surface very sparsely punctured and pubescent. Abdomen very sparsely punctured, last three segments with bristles. Body beneath paler than above, legs testaceous. Length .08 inch; 2 mm.

This species was thought to be *pedicularium*, Grav., but the description by Erichson does not seem to apply.

Two specimens, North Carolina, easily known by their very small size and sparsely punctured elytra.

C. basale, Erich.—Pitchy black, shining, finely pubescent, each elytron with a median basal red spot. Head black, very sparsely punctulate. Thorax slightly broader than the elytra, sides regularly arcuate and narrower to apex, base feebly sinuate on each side, angles obtusely rectangular, surface sparsely and finely punctulate, intervals smooth. Elytra slightly broader at base than long, surface moderately densely and finely punctulate, a red spot on each nearer the suture than the margin. Abdomen piceous black, apical margins of segments paler, surface finely punctulate, each segment with a seta from the upper surface at the sides and two at the margin. Body beneath piceous,

abdomen more distinctly punctured, legs and coxæ rufous. Length .12—.14 inch; 3—3.5 mm.

Occurs over the entire region east of the Rocky Mountains

Varies in color from immaturity to rufous or testaceous.

C. opicum, Say.—Resembles the preceding in form and color and differs as follows: Thorax minutely transversely strigose or alutaceous between the punctures, elytra with entire basal band red. Length .12—.14 inch; 3—3.5 mm.

Occurs more especially in the Gulf States.

Whether the differences indicated above will be found to be constant remains for future determination. The color of the base of the elytra can hardly have much weight and I have separated our specimens entirely by the strigosity of the thorax.

C. scriptum, n. sp.—Pale rufo-testaceous, sparsely pubescent, thorax with a spot on each side of middle at base, elytra at tip and discal spot piceous. Antennæ as long as thorax, rufo-testaceous. Head and thorax shining, scarcely visibly punctulate. Thorax slightly wider than the elytra, sides regularly arcuate and narrower in front, base truncate, hind angles obtuse. Elytra as long as wide, sides near apex, apex and discal spot behind the middle piceous, surface sparsely punctulate, a row of setigerous punctures near the lateral margin. Abdomen sparsely punctulate, setigerous at the sides, darker in color than the elytra. Body beneath pale rufo-testaceous. Length .08—.10 inch; 2—2.5 mm.

This species is easily known by the setæ, usually six in number, at the sides of the elytra. The color may become piceo-testaceous and the discal spot extend so as to join the apical margin.

Occurs abundantly from Michigan to Louisiana.

The sexual characters are very nearly uniform in all the species and are as follows:

Male.—Anterior tarsi more or less dilated. Sixth ventral segment triangularly emarginate, seventh elongate oval, entire. Last dorsal entire.

Female.—Anterior tarsi simple. Last ventral elongate oval, fimbriate at middle of posterior margin. Last dorsal quadrifid.

BOLITOBIUS Steph.

The correct arrangement of the species of this genus presents many difficulties, owing to the relative importance to be assigned to the different characters, the more prominent of which have already appeared in the books. Certain departures from the normal form of the maxillary palpi occur in two species, in which these organs become considerably shortened, the joints more robust and often pubescent, especially the third joint. In these also the last joint loses the strictly slender form and becomes decidedly conical as in *Bryoporus*. Here therefore is the point where the two genera approach and if the latter genus is to

be suppressed at all it must be as a section of the present and not of *Mycetoporus* as suggested by Fauvel.

In all our species the middle and posterior tibiæ are fimbriate at tip with unequal and rather coarse spinules. In *Bryoporus* the spinules are short, equal and closely placed, while in *Mycetoporus* the species are variable, some have unequal and others equal spinules. The femora have usually three apical bristles such as have been noticed in *Conosoma*, etc.

The thorax has the usual marginal punctures but none on the disc. The elytra have three rows of punctures, a sutural, a marginal, and a discal series, as in *Mycetoporus*, while *Bryoporus* has many rows of rather deeply impressed punctures.

The head varies very greatly in length being shortest in those at the beginning of the table, the species being arranged dichotomously, so that, while other characters are kept in view, the head gradually increases in length. In the short headed species the antennæ are more flattened, the joints more closely placed and from the fifth to the tenth transverse and twice as broad as long. These appear to be allied to those for which the genus *Megacronus* was proposed.

Those species which have rufo-testaceous elytra with black spots seem rather indefinite and will require to be separated by a careful examination of the sexual characters, those used in the table being rather for convenience.

Nothing however is less to be depended on than the color of the elytra and it is only to be considered when other characters can be found to substantiate it.

The sexual characters are extremely feeble and will be mentioned with the species in which they have been observed.

The following is the proposed arrangement of the species.

Maxillary palpi elongate, slender, glabrous.....1.
Maxillary palpi short, stout, third joint sometimes pubescent.....4.
1.—Head oval or moderately elongate, never widest at base.....2.
Head very elongate, twice (or even more) longer than wide and widest at base, (fig. 32).....7.
2.—Abdomen variable but always unicolorous.....3.
Abdomen bicolored, red, apical two joints black.....6.
3.—Antennæ with joints 5—10 decidedly transvere, MEGACRONUS, (fig. 31, a).
Elytra unicolored, black or piceous.....**niger.**
Elytra black, apex narrowly, and a broad discal vitta, testaceous.
axillaris.
Antennæ with joints 5—10 distinctly longer than wide. Elytra maculate...5.
4.—Antennæ with joints 5—10 transverse.
Elytra bicolored, black, basal half red.....**dimidiatus.**

Elytra unicolored, rufous..... .....**intrusus.**
Antennæ slender, joints not transverse.....**cingulatus.**
5.—Thorax in part piceous or black. Head oval.
Disc entirely piceous, lateral and basal margins narrowly testaceous.
cinctipollis.
A large black spot in each anterior angle, the two confluent at middle.
anticus.
Thorax entirely rufous or rufo-testaceous.
Head oval, scarcely longer than wide.
Dorsal series of elytra with few punctures..... ..... **pygmæus.**
Dorsal series with many punctures..... .....**trinotatus.**
Head much longer than wide. Dorsal series with few punctures.
obsoletus.
6.—Head elongate, dorsal series with few punctures.....**cinctus.**
7.—Thorax black, lateral and basal margins testaceous; legs pale...**longiceps.**
Thorax entirely black; legs pitchy black..... .....**quæsitor.**

B. niger, Grav.—Black, shining. Head smooth, black, shining, oval. Antennæ piceous, terminal and two basal joints paler, as long nearly as head and thorax, first three joints cylindrical, five to ten flattened and decidedly transverse, eleventh longer, oval at tip. Maxillary palpi moderately elongate and slender. Thorax smooth black, shining, not wider than the elytra, narrower in front, hind angles broadly rounded. Elytra as long as wide, slightly broader at apex than base, smooth black, shining, the punctures of the three rows almost obsolete. Abdomen black, shining, apical margin of penultimate segment often paler, surface sparsely punctured and pubescent, the first three visible segments smoother at middle. Body beneath and legs black, abdomen sparsely and evenly punctured. Length .28—.46 inch; 7—11.5 mm.

Male.—Sixth ventral tricarinate at middle, the middle carina short; between the ends of the outer carina the edge is slightly emarginate.

Female.—Abdominal segments simple.

Variety.—Smaller forms occur of piceous or rufo-piceous color not differing however in any essential character from the normal form.

Occurs in Pennsylvania, Canada, Michigan, Illinois, but is not common anywhere.

B. axillaris, Grav.—Pitchy black, shining, legs piceo-testaceous, elytra with narrow border at tip also a broad dorsal stripe testaceous. Head elongate oval, smooth, black, shining. Antennæ longer than head and thorax, piceous, basal joint testaceous, joints five to ten moderately transverse. Palpi moderately elongate and slender. Thorax slightly broader than the base of the elytra, narrowed in front, hind angles broadly rounded, surface smooth black, shining. Elytra as long as wide, the sutural row of punctures very fine, discal row of five more distinct, lateral series more numerous. Abdomen as in *niger*. Body beneath black, shining, abdomen coarsely punctured. Length .20—.28 inch; 5—7 mm.

Male.—Sixth * ventral segment with a small dentiform carina at middle.

Female.—Abdominal segments simple.

This species is easily known by the ornamentation of the elytra.

Occurs in the Gulf States, not common.

* Erichson says the fifth, but erroneously.

B. dimidiatus, Er.—Piceous shining, basal half of elytra rufous, legs testaceous. Head smooth, black shining, oval. Antennæ as long as head and thorax, piceous, basal joints paler, five to ten transverse, eleventh oval. Thorax piceous, slightly broader than the elytra at base, smooth, shining. Elytra as long as wide, smooth, shining, punctures obsolete, basal half nearly, and an extremely narrow apical border yellowish-red. Abdomen piceous, apical margins of segments paler, surface sparsely punctate. Body beneath piceous, abdomen coarsely punctate. Legs testaceous, anterior coxæ darker. Length .16—.20 inch; 4—5 mm.

Male.—Seventh ventral distinctly sinuate, the middle more prominent.

Female.—Abdomen simple.

This species may be known by the color of the elytra. The palpi are short and stout, third joint distinctly pubescent, fourth evidently conical.

Occurs in the Gulf States, but not common.

B. intrusus, n. sp.—Piceous shining, elytra rufous, legs testaceous. Head oval, smooth black, shining. Antennæ as long as head and thorax formed as in *dimidiatus*. Palpi as in *dimidiatus*. Thorax variable in color from rufo-piceous to black, smooth shining, form as in *dimidiatus*. Elytra entirely rufous or rufo-testaceous, the series of punctures as follows; sutural moderately distinct, dorsal of five distinctly impressed, lateral finely and obsoletely punctured. Abdomen pitchy black, tips of segments paler, punctured as in *dimidiatus*. Body beneath piceous, abdomen coarsely punctured, apical half of segments smoother last two segments with longer fimbriæ. Legs testaceous. Length .24 inch; 6 mm.

Male.—Sixth ventral longitudinally rather deeply impressed and near the tip a spongy space divided in two lateral portions. Anterior tarsi rather strongly dilated.

Female.—Ventral segments simple.

I am not positive concerning the validity of this species. Specimens have been returned to some of his correspondents in this country by Fauvel as *cingulatus* var. The sexual characters are so well marked that there will be no difficulty in determining the identity of the present species with any of those of Europe. The appearance in the present genus of the spongy space so often seen in *Tachinus* is rather remarkable, while the general aspect also approaches that genus.

This species is very variable in the color of the thorax, some are entirely black, others piceous with paler basal margin, others again have the thorax and elytra similar in color. The anterior coxæ are also variable in color.

Occurs from Canada to Pennsylvania.

B. cingulatus, Mann.—Black, shining, elytra and often the thorax rufous, legs testaceous. Head black, shining, rather broadly oval. Antennæ slightly longer than the head and thorax, piceous, terminal and two basal joints paler. Palpi short, stout, last joint distinctly conical. Thorax variable in color from rufous to black, smooth shining, slightly broader at base than the elytra, hind

angles less broadly rounded than in *dimidiatus*. Elytra slightly longer than wide, rufous, sutural and lateral series of punctures fine, dorsal series obsolete. Abdomen pitchy black, apical half of the fifth and sometimes the sixth rufous, sparsely punctured and pubescent. Body beneath piceous, abdomen sparsely punctured, legs and anterior coxæ testaceous. Length .28 inch; 7 mm.

Male.—Anterior tarsi strongly dilated. Last joint of antennæ as long as the two preceding. Seventh ventral segment slightly prolonged at tip and with fine spinules near the tip or arranged sparsely along each side of the middle of the segment, sixth ventral with a feeble emargination at middle.

Female.—Tarsi not dilated. Last joint of antennæ slightly longer than the preceding. Ventral segments simple.

This species corresponds so closely with the descriptions that I feel unwarranted in giving it a distinct name.* The antennæ are more slender than any of the preceding species but more robust than those which follow. The palpi seem almost identical with those of *Bryoporus*. The sculpture and general appearance are however that of *Bolitobius*. It is naturally intermediate between the *Megacronus* group of the genus and the maculate species as well as with the two preceding, exhibiting a tendency to *Bryoporus*. The variable color of the thorax is independent of locality. Two from Canada are black and rufous, and from British Columbia and Oregon also similar, and two others from Pennsylvania, one is black the other rufous.

B. cinctipennis, Say.—Piceous shining, base and sides of thorax testaceous, elytra rufo-testaceous with large black spot on each of variable size, legs testaceous, Head oblong oval, black, shining. Antennæ slender, longer than the head and thorax, piceous, three basal joints testaceous. Palpi slender, long. Thorax black, shining, sides and base narrowly, hind angles more broadly testaceous, not broader than the elytra, hind angles obtuse but not broadly rounded. Elytra slightly longer than wide, yellowish testaceous, a large black spot near the outer angle not attaining the apical margin but nearly always extending upon the epipleuræ; sutural and lateral series of fine punctures, dorsal series nearly obsolete. Abdomen piceous, the hind margin of each segment paler, sparsely punctured. Legs and anterior coxæ testaceous. Length .14—.22 inch; 3.5—5.5 mm.

The sexual characters are not apparent.

Variations occur in the color of the thorax but nothing is seen to disturb its general character. The elytral spot varies in magnitude, and in one specimen from California the spot is small and round and distant from the sides and apex. In specimens with the abdomen greatly extended there is a conspicuous pale band, formed of the apical third of the sixth and the basal third of the seventh segments.

* Since the above was written I have received specimens from M. Sallé of the European form and find them identical.

This species is quite common in the northern portions of our country, extending its range from Pennsylvania to Canada, and westward to British Columbia and California. It is the representative of the European *trimaculatus* in our fauna.

B. anticus, n. sp.—Piceous or piceo-testaceous, thorax and elytra rufo-testaceous, thorax at apical half, a large spot at the outer angle of each elytron and often a scutellar spot nearly black. Head oval, black, shining. Antennæ piceous, apical and four basal joints testaceous. Thorax slightly broader at base than elytra, hind angles obtuse, disc smooth, shining, rufo-testaceous, a large black spot at each anterior angle the two confluent at middle. Elytra slightly longer than wide, discal series distinct, with fine punctures, sutural and lateral series feeble, color rufo-testaceous, a black spot of irregular size and shape near the outer apical angle, attaining the side but not the apical margin, often a circum-scutellar dark space. Abdomen piceous, apical margins of segments paler, surface sparsely punctured. Body beneath black, abdomen piceous sparsely punctured. Legs testaceous, anterior coxæ at base piceous. Length .16—.20 inch; 4—5 mm.

Sexual characters not apparent except that the anterior tarsi of the male are slightly broader than the female.

This species might be confounded with some of the varieties of *pygmæus* which are said to occur in Europe in which the thorax is partly piceous, but in this species the male has a distinct tubercle on the sixth ventral segment.

Occurs in the New England and Middle States, and Michigan.

B. pygmæus, Fab.—Piceo-testaceous, shining, elytra with a triangular spot at scutellum and at each outer angle black. Head rather broadly oval, smooth black, shining. Antennæ slightly longer than the head and thorax, piceous, first four joints testaceous. Thorax at base slightly narrower than the elytra, hind angles obtuse, not broadly rounded, color yellowish testaceous, smooth, shining. Elytra as wide as long, dorsal series of few punctures, sutural and lateral series nearly obsolete, color yellowish testaceous, smooth shining, a long triangular spot at the scutellum, one at each outer angle of the elytra not attaining the apical margin. Abdomen piceo-testaceous varying to rufous, very sparsely punctured. Body beneath piceous, abdomen paler and moderately punctured. Legs and anterior coxæ pale testaceous. Length .14—16 inch; 3.5—4 mm.

Male.—Sixth ventral segment with an obtuse tubercle behind which the segment is slightly impressed.

Female.—Abdomen simple.

Specimens are from the Gulf States, and one from British Columbia.

B. trinotatus, Erichs.—Piceo-testaceous, shining, elytra with a spot in each outer angle and frequently a scutellar spot piceous. Elytra with the three series multipunctate.

This species agrees in form and color with the preceding species and differs superficially in having the dorsal series multipunctate.

The male has not the tubercle as in the preceding species, merely a feeble longitudinal impression.

B. pœcilus, Mann., is said by Fauvel to be the same as this species but may prove distinct, there appears to be at the tip of the sixth segment a small tubercle. If this character is a permanent one the species is distinct.

Distribution extended. Massachusetts, Canada, Michigan, Vancouver, Alaska, Pennsylvania, and District of Columbia.

B. obsoletus, Say.—Black, shining, thorax and elytra rufo-testaceous, elytra with large black spot in each outer apical angle, legs testaceous. Head oblong oval, smooth, black, shining. Antennæ piceous, four basal joints paler. Thorax rufo-testaceous, smooth, shining, as wide at base as the elytra, hind angles broadly rounded. Elytra as wide as long, dorsal series of fine punctures, sutural and lateral series nearly obsolete, color rufo-testaceous, shining, a large black spot in each outer apical angle, covering the entire epipleuræ, not attaining the apical margin. Abdomen pitchy black, apices of segments paler, the apex of the sixth and base of seventh conspicuously rufous, surface sparsely punctate. Body beneath black, abdomen more distinctly punctured. Legs and anterior coxæ testaceous. Length .18—.26 inch; 4.5—6.5.

I am unable to detect any sexual differences.

Resembles the next species, but the color of the abdomen and the shorter head distinguish the present.

Occurs from Virginia to Texas.

B. cinctus, Grav.—Rufous, shining, head, body beneath, a large spot on each elytron and last two abdominal segments black. Head elongate oval, smooth, shining. Antennæ piceous, apical and four basal joints testaceous. Thorax rufous, shining, as broad at base as the elytra, hind angles broadly rounded. Elytra as broad as long, discal row with three or four punctures, sutural and lateral nearly obsolete, color bright rufous with a large black spot attaining the sides but not the apex. Abdomen rufous, very sparsely punctured, last two segments black. Body beneath black, abdomen rufous. Legs, anterior coxæ and apical half of middle testaceous. Length .18—.28 inch; 4.5—7 mm.

Male.—Anterior tarsi very feebly dilated, seventh ventral segment truncate.

Female.—Anterior tarsi simple, last ventral elongate oval.

Variations occur having a narrow basal black band on the elytra, others without the basal band have the two elytral spots united at the suture forming a continuous band, (*gentilis*, Lec.).

Occurs nearly everywhere east of the Rocky Mountains and extends westward to British Columbia.

B. longiceps, Lec.—Pitchy black, shining, elytra, basal margin of thorax and legs rufo-testaceous. Head black, shining, twice as long as wide. Antennæ longer than head and thorax, piceous, basal joint paler. Thorax scarcely wider than long, narrower at base than the elytra, hind angles obtuse, color black, base narrowly, sides at basal half more widely margined with rufo-testaceous.

Elytra rufous shining, as long as wide, dorsal series of five or six rather deeply impressed punctures, sutural and lateral series more feebly impressed. Epipleuræ black. Abdomen pitchy black, apices of segments paler, surface smooth, sparsely punctured. Body beneath black, abdomen coarsely punctured, more densely on the last two segments. Legs testaceous, anterior coxæ piceous at base. Length (including head), .34 inch; 8.5 mm.

I can find no sexual differences in three specimens.

This species and the next have the head distinctly widest at base. There is in some specimens a darker cloud along the discal series of punctures.

Occurs in Canada.

B. quæsitor, (*rostratus* ‖ Lec.)—Black shining, elytra with rufous stripe extending from humerus to apex broader behind. Head more than twice as wide as long, broadest at base. Antennæ black, basal half of first joint paler, also the tip of the last joint. Thorax distinctly wider than long, narrower than the elytra at base, hind angles obtuse. Elytra as broad as long, moderately convex, humeral umbone moderately prominent, discal series of five rather deep punctures, sutural and lateral series much finer; color black with a rufous vitta on each, narrow at the humerus rapidly becoming broader to apical margin attaining the suture. Abdomen black, shining, sparsely punctured. Body beneath black, shining, abdomen coarsely but sparsely punctured. Legs pitchy black. Length (including the head), .28—.40 inch; 7—10 mm.

No sexual characters apparent in two specimens.

The very great length of head is certainly a most remarkable character.

Two specimens, New York and Illinois.

B. biseriatus, Mann., from Alaska, is unknown to us.

BRYOPORUS Kraatz.

This genus has been united with *Mycetoporus* by Fauvel, (Bull. Soc. Linn. de Norm. X, p. 247), but in this I cannot coincide. A careful study of all the specimens which have come before me of both genera has shown that the maxillary palpi have the last joint distinctly conical, as broad nearly at its base as the apex of the preceding joint, and consequently not capable of retraction. In *Mycetoporus* on the contrary the last joint is distinctly subulate, much more slender than the preceding and very plainly capable of retraction to a greater or less extent. Should there be any union at all, this would rather become *Bolitobius* than *Mycetoporus*, from which however the numerous rows of punctures and the structure of the tibiæ at tip readily distinguish it.

As in two species of *Mycetoporus* the middle and posterior tibiæ are fimbriate with closely placed equal spinules.

I am unable to separate the series now before me into any greater number than two species.

Color piceous, elytra with slightly paler humeri, legs pale yellowish testaceous. **flavipes.**

Rufo-piceous, thorax and elytra rufous. Legs rufous ..... **rufescens.**

B. flavipes, Lec.—Piceous, elongate, shining, legs yellowish testaceous. Head and thorax smooth and shining. Thorax with the marginal punctures of *Mycetoporus,* the apical more distant from the margin. Elytra slightly longer than wide, piceous, humeral prominence somewhat paler, disc with about seven rows of moderately impressed punctures bearing very short hairs. Abdomen piceous, apices of segments paler, sparsely punctured each puncture bearing a hair. Body beneath piceous, abdomen punctured as above. Anterior and middle coxæ and legs testaceous. Length .16—.18 inch; 4—4.5 mm.

Occurs in Louisiana.

B. rufescens, Lec.—Head piceous, smooth, shining. Thorax rufous, smooth, shining, punctured as the preceding. Elytra rufous. Abdomen piceous, apices of segments rufous. Body beneath piceous, abdomen rufo-piceous. Legs, anterior and middle coxæ rufo-testaceous. Length .14—.18 inch; 3.5—4.5 mm.

I am entirely unable to separate the types of *rufescens* and *rubidus; testaceus* is rather smaller and in some specimens the elytral punctures are almost entirely obliterated, but this is a gradual variation from the punctured forms and not a constant character.

Occurs from Michigan to Florida, and from Pennsylvania to California.

The investigation of the two species of *Bryoporus* by means of a still larger series may produce a still further suppression, as I am by no means satisfied that the feeble characters separating them are of that value which should cause them to be retained as distinct.

The sexual characters are extremely feeble and are as in *Mycetoporus.*

MYCETOPORUS Mann.

The species of this genus have certain characters in common. The elytra are smooth and shining and with three rows of punctures, usually very distinct sometimes very feeble, placed, one in the sutural channel the second from the humerus to the tip, the other along the lateral margin, the punctures bear fine setæ. The thorax has around its circumference certain constant punctures, four are placed along the apical margin, two basal, three along the lateral margin and two, one behind the other, between the middle and lateral margin. Two species have in addition two discal punctures which are constantly present and wanting in all the other species. The tips of the middle and hind tibiæ in two species are fimbriate with short, equal, closely placed spinules, while the other species have the spinules coarser and very

unequal. The third joint of the maxillary palpi of one species is much more dilated, in fact ovoid truncate at tip, even stouter than in *Tachyporus brunneus*. Color is not to be depended upon in the separation of species except in one instance, *flavicollis*, where the style of coloration is so remarkably different, resembling a *Bolitobius*. By an arrangement of the above characters the following table is produced.

Middle and posterior tibiæ fimbriate at tip with coarse unequal spinules.
  Thorax without discal punctures.
    Third joint of maxillary palpi slender, similar to the second.....**lepidus.**
    Third joint much stouter, ovoid, truncate. Species very slender...**tenuis.**
  Thorax with two discal punctures slightly behind the middle.
    Elytra with one discal row of punctures.....**lucidulus.**
    Elytra with two rows of discal punctures.....**consors.**
Middle and posterior tibiæ fimbriate with equal spinules.
  Elytra uniform in color piceo- or rufo-testaceous; abdomen rufo-testaceous, each segment paler at tip .....**americanus.**
  Elytra piceous black, apical third red; abdomen rufous, last two segments black.....**flavicollis.**
  Elytra more narrowly rufous at tip and a humeral spot.....var. *pictus.*

M. lepidus, Er.—Color and size variable. Head black. Thorax smooth, shining, without discal punctures but with the others as previously enumerated, slightly broader than the base of the elytra. Elytra as long as wide, slightly broader at apex than base, surface shining with the three series of punctures feebly impressed. Abdomen very sparsely punctured and sparsely pubescent, beneath more coarsely punctured. Length .12—.18 inch; 3—4.5 mm.

The color of this species varies so greatly that nothing can be said in a general way. Several marked variations occur as follows:

I. Color above castaneous, elytra darker at the sides and along the suture, abdomen piceo-rufous, tips of segments paler. Lake Superior.

II. Color above rufo-testaceous, abdomen piceo-rufous. These forms imitate *Tachyporus jocosus*. Michigan, Schwarz.

III. Elytra entirely piceous, a narrow pale stripe adjacent and external to the discal row of punctures. Florida, Schwarz.

IV. I have also a specimen from California which for the present I refer to this species. It appears to be of more slender form but this results from the extension of the last two abdominal segments. Its color is as in the Florida specimen.

The color of the legs also varies with that of the upper surface being either rufous or testaceous.

Occurs from Michigan southward to Florida and westward to California.

M. tenuis. n. sp.—Piceous, slender, shining. Head dark rufo-piceous, smooth shining. Antennæ piceous, three basal joints paler. Thorax as broad as the elytra, smooth, shining, rufous, no discal punctures. Elytra piceo-rufous, as broad as long, striæ of punctures moderately distinct. Abdomen piceous, apices of segments paler, shining, very sparsely punctate and slightly pubescent. Body beneath piceous, abdomen more distinctly punctured, legs and coxæ testaceous. Length .10 inch; 2.5 mm.

This species is very much smaller and more slender than *lepidus* and differs more especially in the stouter third joint of the maxillary palpi.

Collected by Dr. Schwarz, in the Lake Superior region.

M. lucidulus. Lec.—Piceous shining, elytra often rufous. Head almost black, smooth shining. Antennæ rufous, basal joints paler. Thorax piceo-rufous, smooth shining, with the usual marginal and two discal punctures behind the middle. Elytra piceo-rufous or rufous, with the usual rows of punctures, and a single, sometimes several punctures in the space between the sutural and humeral rows, form as long as wide. Abdomen piceous, apical margins of segments paler, coarsely but sparsely punctured and sparsely pubescent. Body beneath piceous. Legs testaceous, anterior coxæ always darker. Length .10—.12 inch · 2.5—3 mm.

This species is readily known by the presence of the discal punctures of the thorax and from the next by the elytral sculpture.

Occurs in Pennsylvania and Illinois.

M. consors, Lec.

This species resembles the preceding but is somewhat more robust in form and has an additional row of five or six punctures within the normal humeral row. In every other respect the two species agree and future collections may add this (represented by an unique), to the preceding. Length .14 inch; 3.5 mm.

One specimen, Michigan.

M. americanus, Er.—Rufo-piceous, shining. Head rufo-testaceous, shining. Antennæ testaceous, middle five joints darker. Thorax rufo-testaceous, smooth shining, no discal punctures, slightly broader than the elytra. Elytra distinctly longer than wide, rufo-testaceous, sutural row of punctures distinctly impressed, humeral row obsolete. Abdomen rufo-piceous or rufous, coarsely but sparsely punctured, sparsely pubescent. Body beneath as above, abdomen more distinctly punctured. Legs testaceous. Middle and hind tibiæ obliquely truncate, fimbriate with short equal spinules. Length .12—.14 inch; 3—3.5 mm.

By the structure of the four posterior tibiæ this species may be known from every other except the next species, from this the characters of the table are amply sufficient to distinguish it.

Occurs rather abundantly in the Lake Superior region and British Columbia, Crotch.

M. flavicollis, Lec.—Head piceous, antennæ rufous, basal and apical joints paler. Thorax reddish-yellow, smooth, shining, no discal punctures, slightly wider at base than the thorax. Elytra slightly wider than long, smooth black, shining, apical third red, disc with the usual rows of punctures. Abdomen rufous, last two segments piceous, the apex of the penultimate segment however paler, coarsely punctured, sparsely pubescent. Body beneath black, abdomen rufous, legs testaceous. Length .16 inch; 4 mm.

This species has also the structure of middle and posterior tibiæ of the preceding species, from which its color will readily distinguish it.

Occurs in Michigan, Florida and Georgia.

The variety? *pictus*, Fauvel mss., is of somewhat more slender form and has also a rufo-testaceous humeral spot. These characters are so exactly in accord with the variations of *lepidus* that I think it better to consider this a variety and not a distinct species.

The sexual characters of the species are not very striking, and consist in the slightly stouter antennæ of the male and the sixth ventral segment much less rounded than in the female.

The following are unknown to me.

M. insignis, Mäkl., Bull. Mosc. 1853, III, p. 186.—Oblongus, niger, nitidus; thorace disco lævis-imo, paulo ante marginem basalem punctis quatuor transversim positis impresso segmentorum marginibus, abdominis, elytrisque rufis; his thorace sesqui longioribus in medio macula magna discum totum fere occupante margineque laterali nigris, prope seriem dorsualem punctis duobus impressis; antennis capite cum thorace paullo brevioribus, apicem versus leviter incrassatis pedibusque rufo-testaceis; femoribus posticis infuscatis. Longit. 2¾ lin. Latit. 1 lin. In insula Afognak.

The length of this species as given is so much greater than any other in our fauna that there seems to be some error in the generic determination, otherwise it is a remarkably fine species.

M. nigrans, Mäkl., loc. cit. p. 187 —Subelongatus, niger, nitidus, antennarum basi, thoracis margine basali, elytrorum limbo apicali, pedibusque testaceis; antennis apicem versus modice incrassatis articulis penultimis transversis; thorace punctis quatuor multo intra apicem transversim positis et eodem numero paullo ante marginem basalem impresso; elytris serie punctorum dorsuali simplici. Longit. 1½ lin. Latit. vix ultra ¼ lin.

This species seems to be merely one of the varieties of *lepidus*. The description fits very well certain forms of that species before me.

HABROCERUS Erichs.

This genus is especially distinguished by the form of the hind coxæ which are broadly triangular, concealing the insertion of the femora as well as part of the femur itself in repose. The head is deflexed the antennæ slender, capillary, and very fragile. The abdomen is

margined. Elytra slightly longer than the pectus. Tarsi five-jointed. Mesosternum feebly carinate.

H. Schwarzi, n. sp.—Pitchy black, sub-depressed, shining, elytra pale luteous, legs and coxæ testaceous. Head and thorax pitchy black, smooth, shining. Thorax twice as wide as long, sides moderately arcuate and narrowing to the front; apical margin with six punctures arranged equidistantly, base with four, sides one at middle. Elytra luteous, shining, very sparsely and finely punctate, and under high power finely transversely alutaceous, a setigerous puncture near the humeri, another at the outer apical angle; form broader than long, slightly wider at apex than at base. Abdomen piceous, sparsely punctulate and pubescent. Body beneath piceous, abdomen as above. Legs and coxæ testaceous. Antennæ piceous. Length .08 inch; 2 mm.

This species is closely related to the European *H. capillaricornis*, but is smaller in size, less robust, more slender, the elytra are always luteous, the transverse strigæ more distinctly marked and the sutural angle less prominent. I have had the opportunity of making comparisons through the kindness of M. Aug. Sallé.

The sexes differ in the males having the sixth ventral feebly emarginate at middle. The last dorsals have not been satisfactorily observed.

The specimens before me were collected by Dr. E. A. Schwarz, (to whom it gives me great pleasure to dedicate it), at Detroit, Michigan.

Through some unaccountable error of observation I have attributed (p. 81), but ten joints to the antennæ of our species. I am very glad to be able to correct the error in the same paper in which it occurs, the antennæ are *eleven* jointed.

NOTES.

1.—*Hypocyptus Ziegleri*, Lec. From specimens sent me by M. Sallé, I feel constrained to unite this species with *longicornis*, Payk. The unique of the former is somewhat smaller than the specimen sent by Sallé and darker in color, but does not otherwise differ. *H. Crotchii* is however much more distinctly punctured.

2.—On p. 85 I have associated *Trichophyus* and *Habrocerus*, following the course of preceding authors. I have lately had an opportunity of examining the former genus and from the insertion of the antennæ am convinced that it is rather a member of the group Quedii of the tribe Staphylinini, allied to *Acylophorus* and *Heterothops*. It is however rather anomalous in such alliance but no more so than is *Habrocerus* with the Tachyporini.

3.—Types of all the Alaskan species of *Tachinus*, except *apterus*, Mäkl., as well as several of the *Bolitobius* have been examined, specimens having been sent to Dr. Leconte by Chaudoir and Mannerheim.

Bibliography and Synonymy.

HYPOCYPTUS Mann.

Brachelytra, 1830, p. 58.

H. longicornis, Payk., (*Scaphidium*), Fauna Suec. III., p. 340; Mann. Brachel., p. 58; Erichs. Gen. Staph., p. 215; Duval Gen. Col. Eur., pl. 9, fig. 42.

Ziegleri, Lec., New Species, 1863, p. 30.

H. Crotchii, n. sp.

ANACYPTUS, n. g.

A. testaceus, Lec., (*Hypocyptus*), New Species, 1863, p. 30.

TRICHOPSENIUS, n. g.

T. depressus, Lec., (*Hypocyptus?*), New Species, 1863, p. 30.

TACHINUS Grav.

Micr. I., 1802, p. 135.

T. maculicollis, Mäkl., Bull. Mosc., 1852, II., p. 311.

T. semirufus, n. sp.

T. memnonius, Grav., Micr., p. 192; Erichs., Gen. Staph., p. 258.

batychrous, Grav., loc. cit., p. 191.

rufus, Sachse, Stettin Zeitschr., 1852, p. 121.

T. tachyporoides, n. sp.

T. agilis, n. sp.

T. angustatus, n. sp.

T. debilis, n. sp.

T. repandus, n. sp.

T. serutator, Horn.

discoideus ‖ Mels., Proc. Acad., 1844, p. 32.

Leucoparyphus disc. Lec., List, p. 22.

T. mimus, n. sp.

T. addendus, n. sp.

T. parallelus, n. sp.

T. nigricornis, Mann., Bull. Mosc., 1843, II., p. 325.

T. luridus, Erichs., loc. cit., p. 920. Placed erroneously in *Coproporus* in Munich Catalogue, p. 557, as is also *limbatus*.

flavipennis, Dej. Cat.

T. canadensis, n. sp.

ustulatus, Fauv. mss.

T. fimbriatus, Grav., p. 191; Erichs., p. 258.

T. picipes, Erichs., p. 257.

T. Schwarzi, n. sp.

T. limbatus, Mels., Proc. Acad. II., p. 32. See note under *luridus*.

T. fumipennis, Say, Trans. Am. Phil. Soc. IV., p. 466.

axillaris, Erichs., p. 261.

colonus, Sachse, Stettin Zeitschr., 1852, p. 121.

T. frigidus, Erichs., p. 256.

propinquus, Mann., loc. cit., p. 226.

T. Crotchii, n. sp.

T. instabilis, Mäkl., Bull. Mosc., 1853, III., p. 185.

apterus, Mäkl., loc. cit., p. 186.

T. circumcinctus, Mäkl., Bull. Mosc., 1852, II., p. 310.

T. nitidulcides, n. sp.

TACHYPORUS Grav.

Monogr., 1806, p. 1.

T. maculipennis, Lec., Proc. Acad., 1866, p. 374.

T. elegans, n. sp.

T. jocosus, Say, Trans. Am. Phil. Soc. IV., p. 466.

arduus, Er., Gen. Staph., p. 237.

T. chrysomelinus, Linn., Fauna Suecc. nr. 855; Erichs., Gen. Staph., p. 235.

var. *acaudus*, Say, Trans. Am. Phil. Soc. IV., p. 467.

var. *maculicollis*, Lec., Proc. Acad., 1866, p. 374.

T. californicus, n. sp. (*angusticollis*, Fauv. mss.)

T. nanus, Erichs., Gen. Staph., p. 240.

T.? scitulus, Erichs., Käfer Mark Brand. I., p. 395; Gen. Staph., p. 240.

T. brunneus, Fab., (*Oxyporus*), Ent. Syst. I., 2, p. 535; Erichs., Gen. Staph., p. 241.

faber, Say, Trans. Am. Philos. Soc. IV., p. 468, (European Synon. omitted).

CILEA Duval.

Gen. Col. Eur. Staph., p. 25.

C. silphoides, Linn., (*Staphyl.*), Syst. Nat. I., 2, p. 684; Erichs. Staph., p. 245; Duval, loc. cit., pl. 10, fig. 46.

marginalis, Grav., Micr., p. 192.

geminatus, Rand., Bost Journ. II., p. 39.

Synonymy not pertinent to our fauna omitted.

PHYSETOPORUS, n. g.

P. grossulus, Lec., (*Coproporus*), New Species, Col. 1863, p. 31.

ERCHOMUS Motsch.

Bull. Mosc., 1858, III., p. 218.

E. inflatus, n sp. (*idem* Fauvel. mss.)

E. punctipennis, Lec., (*Coproporus*), New Species, Col. 1863, p. 31.

E. ventriculus, Say, (*Tachyp.*), Trans. Am. Phil. Soc. IV., p. 466.

gibbulus, Er., Gen. Staph., p. 252.

acuductus, Kby., Fauna Bor. Am., p. 90.

affinis, Kby., loc. cit., p. 91.

punctulatus, Mels., Proc. Acad. II., p. 32.

E. lævis, Lec., (*Coproporus*), New Species, Col. 1863, p. 31.

CONOSOMA Kraatz.

Insecten Deutschl. II., p. 431.

C. littoreum, Linn., (*Staph.*), Fauna Suec. nr. 852; Erichs., Gen. Staph., p. 219.

C. Knoxi, Lec., Proc. Acad., 1866, p. 374.

C. crassum, Grav., (*Tachyp.*), Microp., p. 190; Erichs., loc. cit., p. 222.

maestus, Say, Trans. Am. Philos. Soc. IV., p. 466.

C. bisignatum, n. sp.

C. castaneum, n. sp., (*acutangulum* Fauvel, mss.)

C. pubescens, Payk., Mon. Carab. App. 1790, p. 138; Erichs., loc. cit., p. 221; (*adeps*, Zimm., mss.; *angustatum*, Fauvel, mss.)

C. parvulum, n. sp.

C. basale, Erichs., Gen. Staph., p. 225.

pulicarius, Sachse, Stettin Zeitsch., 1852, p. 120.

C. opicum, Say, (*Tachyp.*), Trans. Am. Philos. Soc. IV., p. 467.

cinctulus, Erichs., Gen. Staph., p. 226.

C. scriptum, n. sp., (Fauvel, mss.)

BOLITOBIUS Steph.

Illust. Brit. Ent. V., 1832, p. 171.

B. niger, Grav., (*Tachinus*), Micr. 193, 5; Erichs., (*Bolit.*), Gen. Staph., p. 275.

B. axillaris, Grav., (*Tachinus*), Mon. 29, 11; Erichs., loc. cit., p. 274.

B. dimidiatus, Erichs., loc. cit., p. 276.

B. cingulatus, Mann., Brachel. 64, 2; Erichs., loc. cit., p. 270.

B. intrusus, n. sp.

B. cincticollis, Say, (*Tachinus*), Trans. Am. Phil. Soc. n. s. IV., 465; Erichs., (*Bolit.*), loc. cit., p. 922.

bimaculatus, Couper.

B. anticus, n. sp.

B. pygmæus, Fab., (*Oxyporus*), Spec. Ins. 339; Mann., (*Bolit.*), loc. cit., 65, 10; Erichs., loc. cit., p. 280.

trimaculatus, Say, loc. cit., p. 464.

venustus, Mels., *binotatus*, Mels., Proc. Acad. II., p. 33.

angularis, Sachse, Stettin Zeitschr., 1852, p. 122.

B. trinotatus, Erichs., loc. cit., p. 279.

pœcilus, Mann., Bull. Mosc., 1852, II., p. 312.

B. obsoletus, Say, (*Tachinus*), loc. cit., p. 464.

sellatus, Sachse, loc. cit., p. 122.

B. cinctus, Grav., (*Tachinus*), Micr. 193, 6; Erichs., (*Bolit.*), loc. cit., p. 278.

atricaudatus, Say, Journ. Acad. III., p. 158.

var. *gentilis*, Lec., New Species, 1863, p. 31.

B. longiceps, Lec., New Species, 1863, p. 32.

B. quæsitor, Horn, *rostratus*, ‖ Lec., New Species, 1863, p. 32.

B. biseriatus, Mann., Bull. Mosc., 1846, II., p. 508. Alaska. Unknown.

From specimens which I take to be this species collected by Mr. Crotch in British Columbia, it appears to be merely *cincticollis*, Say.

BRYOPORUS Kr.

Nat. Ins. II., 1857, p. 452.

B. flavipes, Lec., New Species, 1863, p. 32.

B. rufescens, Lec., loc. cit., p. 33.

rubidus, Lec., *testaceus*, Lec., ibid.

MYCETOPORUS Mann.

Brachelytra, 1830, p. 62.

M. lepidus, Grav., (*Tachinus*), Mon. 26, p. 4; Mann., (*Mycet.*), Brachel. p. 63; Erichs., Gen. Staph., p. 284. *European synonymy omitted.*

humidus, Say, Trans. Am. Phil. Soc. IV., p. 465.

M. tenuis, n. sp.

M. lucidulus, Lec., New Species, 1863, p. 33.

M. consors, Lec., loc. cit., p. 34.

M. americanus, Erichs., Gen. Staph., p. 285.

M. flavicollis, Lec., loc. cit., p. 33.

var. *pictus* Fauvel, mss.

M. insignis, Mäkl., Bull. Mosc., 1853, III., p. 186.

M. nigrans, Mäkl., loc. cit., p. 187.

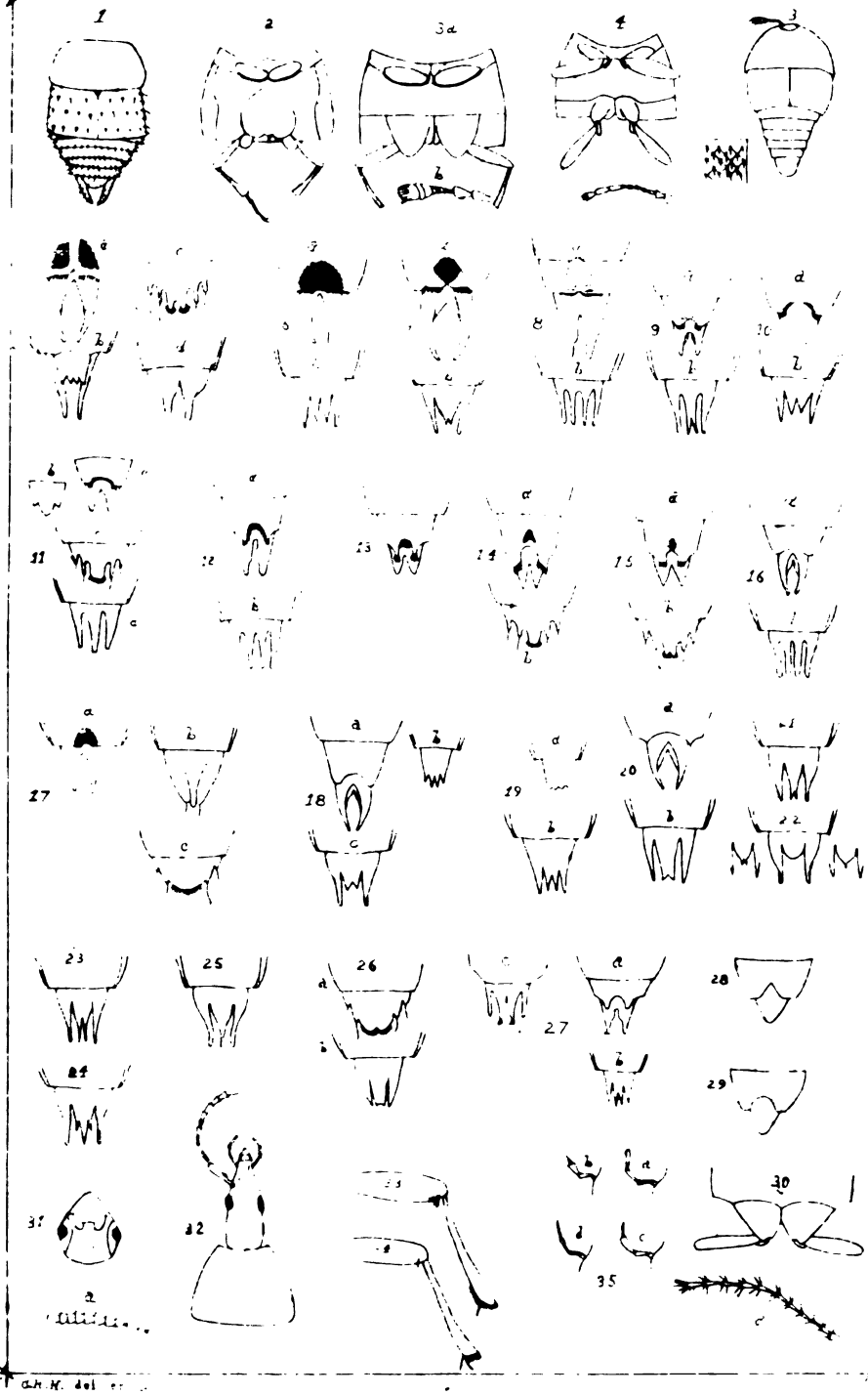
HABROCERUS Er.

Käfer Mark Brand. I., 1837, p. 400.

H. Schwarzi, n. sp.

EXPLANATION OF PLATE I.

Fig. 1.—*Trichopsenius depressus*, (Lec.)
Fig. 2.—*Trichopsenius depressus*, underside.
Fig. 3.—*Anacyptus testaceus*, (Lec.); 3 *a*, underside; 3 *b*, antenna, elytral sculpture magnified.
Fig. 4.—*Hypocyptus longicornis*, (Payk.); underside and antenna.
Fig. 5.—*Tachinus maculicollis*, Mäkl.; *a*, last two ventrals ♂; *b*, dorsals ♂; *c*, last ventral ♀; *d*, last dorsal ♀.
Fig. 6.—*T. semirufus*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 7.—*T. memnonius*, Grav., *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 8.—*T. tachyporoides*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 9.—*T. agilis*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 10.—*T. angustatus*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 11.—*T. debilis*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♂; *c*, last ventral ♀; *d*, last dorsal ♀.
Fig. 12.—*T. repandus*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 13.—*T. scrutator*, Horn, last two ventrals ♂.
Fig. 14.—*T. mimus*, Horn, *a*, last two ventrals ♂; *b*, last ventral ♀.
Fig. 15.—*T. addendus*, Horn, *a*, last two ventrals ♂; *b*, last ventral ♀.
Fig. 16.—*T. parallelus*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 17.—*T. nigricornis*, Mann., *a*, last two ventrals ♂; *b*, last dorsal ♀: *c*, last ventral ♀.
Fig. 18.—*T. fimbriatus*, Grav., *a*, last two ventrals ♂; *b*, last ventral ♂; *c*, last dorsal ♀.
Fig. 19.—*T. picipes*, Er., *a*, last dorsal ♂; *b*, last dorsal ♀.
Fig. 20.—*T. Schwarzi*, Horn, *a*, last two ventrals ♂; *b*, last dorsal ♀.
Fig. 21.—*T. canadensis*, Horn, last dorsal ♀.
Fig. 22.—*T. limbatus*, Mels., last dorsal ♀, and variations of middle lobe.
Fig. 23.—*T. frigidus*, Erichs., last dorsal ♀.
Fig. 24.—*T. Crotchii*, Horn, last dorsal ♀.
Fig. 25.—*T. instabilis*, Mäkl., last dorsal ♀.
Fig. 26.—*T. circumcinctus*, Mäkl., *a*, last ventral ♀; *b*, last dorsal ♀.
Fig. 27.—*Cilea silphoides*, (Linn.), *a*, last two ventrals ♂; *b*, last dorsal ♂; *c*, last ventral ♀.
Fig. 28.—*Erchomus punctipennis*, (Lec.), last two ventrals ♂.
Fig. 29.—*E. ventriculus*, (Say), last two ventrals ♂.
Fig. 30.—*Habrocerus Schwarzi*, Horn, posterior coxæ; *a*, antenna (after Erichson).
Fig. 31.—Underside of head of *Bolitobius niger*, showing the margin beneath the eyes; *a*, antenna.
Fig. 32.—Head and thorax of *Bolit. quasitor*.
Fig. 33.—Middle femur and tibia of *Conosoma crassum*.
Fig. 34.—Middle femur and tibia of *C. castaneum* and others.
Fig. 35.—Maxillary palpi; *a*, *Bolitobius*, (filiform); *b*, *Bryoporus*, (conical); *c*, *Mycetoporus*, (subulate); *d*, *Habrocerus*, (last joint long, slender and acute).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Notes on the species belonging to the subfamily ICHNEUMONIDES, found in America north of Mexico.

BY E. T. CRESSON.

In the first volume of these Transactions (p. 289), I began the publication of a list of the Ichneumonidæ of North America, intending to continue it from time to time until completed; but after the printing of the second part (vol. ii, p. 89), the acquisation of new and more abundant material made it necessary that the work should be gone over again, and suggested many important changes, which render the lists given in the two parts of but little value. I have not since attempted a revision of the subject, prefering to wait for larger collections, and further knowledge of the economy and habits of the species. The great dissimilarity in color between the sexes in many cases—as shown in the European species—renders it extremely difficult and unsafe to corelate them; this, however, can only be determined upon by actual observation and by breeding, and will require years of patient labor, chiefly in the field.

In the present paper, which is intended merely to assist the student in separating the species, I have included only those known to me as having been found north of Mexico, which are of themselves very numerous, prefering to make at some future time a separate list of the subtropical species, which exhibit a still greater variation in form. A list of the Mexican species has already been given in the Proceedings of the Academy of Natural Sciences, 1873, p. 104, etc.

In lieu of a more satisfactory division of the subfamily, I have for the present adopted that given by Holmgren in his *Ichneumonologia Suecica*, which is as follows:—

Metathoracic spiracles linear or oval.

Petiole of abdomen not depressed, not broader than high.

Abdomen ♀ acute at tip, last ventral segment retracted; ♂ ventral segments 2–4 with longitudinal fold..... .....**Ichneumonides oxypygi.**

Abdomen ♀ obtuse at tip, last ventral segment slightly or not at all retracted; ♂ ventral segments 3—8 or 4—8 flat, smooth, without longitudinal fold.....**Ichneumonides amblypygi.**

Petiole of abdomen depressed, broader than high....**Ichneumonides platyuri.**

Metathoracic spiracles circular.....**Ichneumonides pneustici.**

Ichneumonides oxypygi.

Scutellum more or less flat, or convex and then gradually sloping to apex; metathorax rarely bispinose ..... ICHNEUMON.

Scutellum strongly elevated or gibbous, abruptly declivous behind; metathorax always bispinose..... .... HOPLISMENUS.

ICHNEUMON, Linn.

Under this subgenus, there are at present over two hundred species to record, many of which, on future study and observation, will doubtless prove to be varieties or sexes of other species already described. In the somewhat difficult task of tabulating such a large number of species it has been found more convenient, and in fact necessary, to separate the sexes; and color, although quite variable at times, has been found more constant and satisfactory for the principal divisions than form or sculpture.

In the females of many species there will be observed on the *posterior* coxæ beneath, (generally situate near the tip and seen more readily from a lateral view), a scopa or patch of short, more or less dense, brush-like pubescence; this, while constant in some species, is variable in others, being sometimes distinct or entirely wanting in specimens of the same species. The sculpture of the thorax has little or no significance, while that of the first and second abdominal segments is of some specific value. The sculpture of the postpetiole, or apex of first segment, which is either rugose, aciculated, punctured or smooth, and the shape and depth of the gastrocœli, or basal foveæ or depression on each side of second segment, when present, are generally of considerable importance in separating the species. These characters when found to be constant, have been used to advantage in making up the following tables.

FEMALES.

Abdomen black or blue, without pale bands or spots except sometimes on apex of first or last segments..... SECTION I.

Abdomen black, marked with white or yellow spots or bands, and sometimes varied with ferruginous..... SECTION II.

Abdomen ferruginous, apex black..... SECTION III.

Abdomen ferruginous or fulvous; the first and base or apex of two or three following segments sometimes more or less black..... SECTION IV.

Section I.—*Abdomen black or blue, without pale bands or spots except sometimes on apex of first or last segments.*

Posterior legs black, their tibiæ immaculate.

Coxal scopa distinct.

Apex of abdomen immaculate.

Wings fuliginous.

Postpetiole scabrous.

Coxal scopa rather large, flat.....3. **maurus.**

Coxal scopa small, tuberculiform.....7. **cinctiformis.**

Postpetiole finely aciculated; coxal scopa small.....4. **germanus.**

Postpetiole punctured; coxal scopa large, flat.....5. **viola.**

Wings hyaline.

Scutellum white; abdomen black tinged with blue.....29. **agnitus.**

Scutellum white only at sides; abdomen steel-blue.....23. **cæruleus.**

Apex of abdomen with one or more white spots.

Posterior trochanters black.

Wings fuliginous.....26. **scelestus.**

Wings hyaline.....18. **sævus.**

Posterior trochanters white.....41. **extrematatis.**

Coxal scopa wanting.

Apex of abdomen immaculate.

Wings fuliginous.

Scutellum black.

Head large subquadrate; posterior angles of metathorax rounded.

Pale orbital lines distinct in front above the antennæ; gastrocoeli large.....1. **Orpheus.**

Pale orbital lines wanting; gastrocoeli small.....2. **sanctus.**

Head of usual size; posterior angles of metathorax spiniform.

Abdomen deep black; gastrocoeli small, shallow.....6. **malacus.**

Abdomen tinged with blue; gastrocoeli small, deep...13. **solitus.**

Scutellum more or less white.

Head large, buccate.....1. **Orpheus,** var.

Head of usual size, not buccate.....27. **caliginosus.**

Wings hyaline.

Scutellum black.

Abdomen steel-blue.....22. **chalybeus.**

Abdomen black, sometimes faintly tinged with blue.

Postpetiole aciculated.....19. **ater.**

Postpetiole punctured.....20. **apertus.**

Scutellum more or less white.

Postpetiole broadly dilated.

Gastrocoeli small, moderately deep; anterior orbits indistinctly pale.....34. **subcyaneus.**

Gastrocoeli very large and deep; pale orbital lines entire and distinct.....36. **vitalis.**

Postpetiole narrower, gradually dilated.

Head large, buccate; postpetiole punctured.....20. **apertus,** var.

Head of usual size; postpetiole finely aciculated....37. **mendax.**

Apex of abdomen with one or more pale spots; scutellum white.

Three apical segments each with a pale spot; pale orbital lines distinct in front above the antennæ.....39. truculentus.

Two apical segments each with a pale spot; no pale orbital lines.
Postpetiole broadly dilated; thorax, except scutellum, entirely black; wings smoky.....38. **bimembris.**
Postpetiole narrow; collar above, line in front and beneath tegulæ white; wings clear.....40. **brevicinctor.**
Posterior legs black or blue, their tibiæ marked with white or yellow.
Mesothorax brown-ferruginous.....11. **centrator.**
Mesothorax black.
Coxal scopa distinct.
Apex of abdomen immaculate.
Scutellum entirely black.....16. **corvinus.**
Scutellum black, white only at sides.....25. **navus.**
Scutellum white.
Coxal scopa very large, covering nearly their entire under surface; posterior tibiæ with white line behind near base.....46. **sagus.**
Coxal scopa narrow, linear; posterior tibiæ with an entire white annulus near base.....47. **promptus.**
Apex of abdomen with a white spot.....43. **stygicus.**
Coxal scopa wanting.
Apex of abdomen immaculate.
Scutellum black.
Femora incrassate; pale orbital lines distinct in front above the antennæ.....45. **pravus.**
Femora slender; pale orbital lines wanting.....44. **pilosulus.**
Scutellum pale.
Metathorax with round white spot on each flank.....57. **otiosus.**
Metathorax immaculate.....56. **unifasciatorius.**
Apex of abdomen with one or more pale spots.....42. **atrox.**
Posterior legs black; coxæ, femora and tibiæ marked and banded with white; abdomen steel-blue.....24. **pulcher.**
Posterior legs black; base of tibiæ and the tarsi ferruginous; apex of abdomen with two pale spots.....62. **gestuosus.**
Posterior legs black, their femora ferruginous.....65. **semilævis.**
Posterior legs ferruginous.
Apex of abdomen immaculate.....67. **pedalis.**
Apex of abdomen more or less white.....69. **helvipes.**

Section II.—*Abdomen black, marked with white or yellow spots or bands, and sometimes varied with ferruginous.*

Second segment only with two white spots.....70. **bioculatus.**
Second segment only with white or yellowish band.
Coxal scopa distinct.....71. **uncinatus.**
Coxal scopa wanting.....72. **feralis.**
Second and third segments each with a yellowish band.
Coxal scopa distinct; two white spots at tip of abdomen....76. **calitergus.**
Coxal scopa wanting.
Apex of abdomen immaculate.....73. **bizonatus.**
Apex of abdomen with white spots.....72. **feralis,** var.
Second, and often third segments with a yellowish band at tip, apical segments ferruginous, also mesothorax and generally the metathorax; femora black.....101. **subdolus.**

Second segment fulvous, a whitish band at tip of segments three, four and six; legs fulvous or ferruginous.....102. **jucundus.**
All the segments with a yellow band at tip.
Coxal scopa distinct; face yellow.....90. **zebratus.**
Coxal scopa wanting; face black.....97. **atrifrons.**

Section III.—*Abdomen ferruginous, apex black.*

Coxal scopa distinct .....113. **volesus.**
Coxal scopa wanting.
Scutellum entirely black.....114. **involutus.**
Scutellum whitish or ferruginous.
Antennæ slender, basal joints of flagellum elongate cylindrical.
Thorax entirely black.....160. **instabilis.**
Thorax black; mesothorax and large mark on pleura ferruginous; apex of abdomen with pale spots.....119. **terminalis.**
Thorax entirely ferruginous.
Third joint of antennæ double the length of fourth.
Apex of abdomen without pale spot; tip of segments two to four black.....132. **indemnis.**
Apex of abdomen with pale spot; segments one to three entirely ferruginous.....133. **caudatus.**
Third joint of antennæ scarcely longer than fourth; apex of abdomen with pale spot.....134. **putus.**
Antennæ with short, thick-set subquadrate joints.
Abdomen with segments one to three ferruginous, base of third with black band.....127. **vecors.**
Abdomen with segments one to three or four entirely ferruginous.
Four anterior femora unusually swollen.
Apex of abdomen without pale spot.....128. **nigrovariegatus.**
Apex of abdomen with pale spot.....129. **humilis.**
Four anterior femora not unusually swollen.
Size medium; legs, except coxæ and trochanters, entirely ferruginous.....131. **seditiosus.**
Size small; posterior femora and tibiæ marked with black.
Apex of abdomen black, immaculate.....121. **hospitus.**
Apex of abdomen with pale spot.....130. **tumidifrons.**

Section IV.—*Abdomen ferruginous or fulvous; the first and base or apex of two or three following segments sometimes more or less black.*

Wings fuliginous.
Coxal scopa distinct.
Thorax black.....135. **grandis.**
Thorax ferruginous; sutures of abdominal segments strongly constricted; head unusually large.....149. **trogiformis.**
Coxal scopa wanting.
Thorax black.
Posterior legs entirely black.
Antennæ short, involute.....136. **inurbanus.**
Antennæ long, slender.....137. **rufiventris.**
Posterior legs black, their tibiæ white at base.....139. **devinctor.**
Posterior legs black, their tibiæ dull-ferruginous.....140. **lividulus.**

Posterior legs black, their femora ferruginous.....141. **insolens.**
Posterior legs ferruginous.....137. **rufiventris,** var.
Thorax more or less ferruginous.
Posterior legs entirely black; head black.....143. **dorsalis.**
Posterior legs, except coxæ, entirely ferruginous; head ferruginous; second abdominal segment sometimes black at base...144. **Lewisii.**
Thorax, legs and entire body ferruginous.
Antennæ black, base sometimes ferruginous.....145. **purpuripennis.**
Antennæ ferruginous, apical third black, middle joints tinged with yellowish.....147. **compar.**
Wings hyaline or subhyaline.
Thorax entirely black.
Scutellum black.....156. **virginicus.**
Scutellum white or yellow.
Abdomen with base of segments more or less black..159. **canadensis.**
Abdomen except base of first segment entirely ferruginous.
Apex of abdomen without pale spot; antennæ with short, thick-set joints.....168. **funestus.**
Apex of abdomen with pale spot.
Antennal joint 3 longer than 1 and 2 together.....161. **fuscifrons.**
Antennal joint 3 not longer than 1 and 2 together.
Posterior tibiæ whitish on basal half.....164. **ultimus.**
Posterior tibiæ ferruginous, black at tips.....165. **vivax.**
Thorax black, metathorax more or less marked with white...170. **w-album.**
Thorax black, meso- and sometimes metathorax more or less ferruginous.
Posterior tibiæ ferruginous, black at tips.
Apex of abdomen without pale spot.....160. **instabilis.**
Apex of abdomen with pale spot.
Posterior coxæ black; gastrocœli deep, foveiform.....169. **maius.**
Posterior coxæ ferruginous; gastrocœli very transverse.....163. **velox.**
Posterior tibiæ with pale annulus.
Length of body .40 inch.....173. **signatipes.**
Length of body .25—.30 inch.....174. **annulipes.**
Posterior legs, except sometimes the coxæ, entirely ferruginous.
Antennæ with pale annulus.
Scutellum yellow; abdomen with segments one to four more or less black at base; antennæ and legs robust.....177. **seminiger.**
Scutellum ferruginous; abdomen entirely ferruginous; antennæ and legs slender.....178. **flebilis.**
Antennæ pale ferruginous, black at tips, subrobust; abdomen entirely ferruginous.....180. **hiemalus.**
Antennæ, except first joint, entirely black, slender; spot on pleuræ and abdomen entirely, ferruginous.....179. **sequax.**
Thorax ferruginous, mesothorax only black.....162. **confirmatus.**
Thorax entirely ferruginous, or with black sutures or stains.
Abdomen with one or more segments banded or margined with black.
Antennæ long, slender, basal joints of flagellum elongate, cylindrical.
Third joint double the length of fourth; segments three to five of abdomen narrowly margined at apex with black...181. **subfulvus.**
Third joint slightly longer than fourth; broad band at base of segment three of abdomen, and spot on disc of two, black...182. **cestus.**

Antennæ short, with thick-set joints.
Posterior femora and tibiæ black at tips; antennæ with white annulus; scutellum yellowish.....183. **vicinus.**
Posterior legs entirely ferruginous; antennæ without pale annulus; scutellum ferruginous.....184. **brevipennis.**
Abdomen with large black mark on disc of segments two and three, apical segment with pale spot.....188. **disparilis.**
Abdomen entirely ferruginous.
Metathorax with two prominent, flattened tubercles.....201. **rutilus.**
Metathorax without prominent tubercles.
Postpetiole densely and finely scabrous; antennæ robust, with short, thick-set joints.....189. **russatus.**
Postpetiole distinctly aciculate.....160. **instabilis,** var.
Postpetiole either smooth, or indistinctly aciculated.
Antennæ entirely ferruginous.
Size medium; antennal joints elongate.....190. **semissus.**
Size small; antennal joints short.....200. **petulcus.**
Antennæ with pale annulus.
Second segment of abdomen impunctured.....193. **proximus.**
Second segment closely and finely punctured; posterior tibiæ pale at base, fuscous at tip: thorax varied with dusky...194. **nanus.**
Second segment of abdomen coarsely punctured; body and legs entirely ferruginous.....195. **rubicundus.**
Postpetiole distinctly punctured.
Clypeus very short and broad, its anterior margin broadly arcuated, exposing most of the mentum.....196. **residnus.**
Clypeus of usual proportions, its anterior margin truncate, covering the mentum.....198. **soror.**

MALES.

In the following table, which will serve to distinguish the males, those of the species belonging to *Amblyteles* (of the division *amblypygi*) are included, it being difficult and often impossible to separate them from the males of *Ichneumon*, the ventral fold sometimes varying considerably in length in specimens of the same species.

Abdomen black or blue, without pale bands or spots, except sometimes on apex of first or last segments.....SECTION I.
Abdomen black spotted or banded with white beyond first segment and before apex.....SECTION II.
Abdomen black and yellow, sometimes varied with ferruginous.....SECTION III.
Abdomen fulvo-ferruginous, apical margins of segments 1—4, and terminal segment pale yellow.....SECTION IV.
Abdomen bright saffron-yellow, the three or four apical segments black; legs entirely yellow.....SECTION V.
Abdomen more or less ferruginous or fulvous, apex always black.....SECTION VI.
Abdomen ferruginous or fulvous, the first and base or apex of two or three following segments more or less black, apex never black.....SECTION VII.

Section I.—*Abdomen black or blue, without pale bands or spots, except sometimes on apex of first or last segments.*

Posterior legs entirely black.
- Antennæ orange-yellow, black at extreme base and apex...12. **flavicornis.**
- Antennæ black, with pale annulus.
  - Apex of abdomen immaculate.
    - Wings dark fuliginous.
      - Postpetiole entirely black.
        - Face entirely black; annulus on antennæ broad.....8. **galenus.**
        - Face black; white laterally; annulus on antennæ narrow.
          - Scutellum black.
            - Antennæ short, pale annulus entire.....9. **torvinus.**
            - Antennæ long, pale annulus interrupted beneath...10. **citimus.**
          - Scutellum white; sides of face broadly white.....28. **histricus.**
      - Postpetiole more or less white at tip; face white, sometimes black in lateral depressions.....56. **unifasciatorius.**
    - Wings hyaline or subhyaline.
      - Small; face entirely black or with pale orbital lines.....21. **acerbus.**
      - Larger; face entirely white or spotted with white...14. **scriptifrons.**
  - Apex of abdomen with one or more pale spots.
    - Postpetiole entirely black.
      - Posterior trochanters black.....40. **brevicinctor.**
      - Posterior trochanters white.....41. **extrematatis.**
    - Postpetiole narrowly margined at apex with white.
      - Metathorax immaculate.....32. **citatus.**
      - Metathorax with round white spot on each flank.....33. **merus.**
- Antennæ entirely black or blue.
  - Scutellum entirely black or blue.
    - Body deep black, rather shining; wings hyaline.....17. **odiosus.**
    - Body blue-black, opaque; wings dusky.....**Ambly. montanus.**
  - Scutellum white.
    - Face white with black central stripe.
      - All the coxæ black.....35. **neutralis.**
      - Four anterior coxæ white.....30. **pepticus.**
    - Face entirely white.....31. **pervagus.**

Posterior legs black, their tibiæ more or less white.
- Antennæ black, with pale annulus.
  - Apex of abdomen immaculate.
    - Postpetiole entirely black.
      - Posterior tibiæ white, black at tips; four anterior coxæ and trochanters white.....48. **vagans.**
      - Posterior tibiæ with an entire white annulus at base.
        - Posterior trochanters white, tibiæ white at base; scutellum white laterally.....25. **navus.**
        - Posterior trochanters black, tibiæ black at extreme base; scutellum entirely white.....47. **promptus.**
      - Posterior tibiæ with white line above towards base.
        - Metathorax immaculate; annulus on antennæ entire.....46. **segus.**
        - Metathorax with two white spots behind; annulus on antennæ interrupted beneath.....53. **sublatus,** var.

Postpetiole with white spot or band at tip.
Metathorax immaculate.....56. **unifasciatorius.**
Metathorax with two white spots behind.....53. **sublatus,** var.
Apex of abdomen marked with white.. .....Ambly. **improvisus.**
Antennæ entirely black.
Postpetiole entirely black.
Scutellum entirely black.....15. **macilentus.**
Scutellum pale.
Apex of abdomen black.
Metathorax immaculate.
Posterior tibiæ white or yellow, black at tips.
Wings fuscous.....58. **Bronteus.**
Wings subhyaline.
Posterior tarsi whitish; all the coxæ black.....59. **audax.**
Posterior tarsi white, annulate with black; four anterior coxæ white.....60. **cinctitarsis.**
Posterior tarsi entirely black, all the coxæ white...Ambly. **ultus.**
Posterior tibiæ black, with white line above.
Face entirely black.....Ambly. **expunctus.**
Face white laterally, centrally black.
Postpetiole coarsely aciculated.
Abdomen black, second segment uniformly sculptured; posterior coxæ marked with white.....Ambly. **ultus,** var.
Abdomen blue-black, second segment coarsely and longitudinally rugose on basal middle; posterior coxæ entirely black.....Ambly. **stadaconensis.**
Postpetiole smooth or punctured.
Sides of face narrowly white.....51. **cordatus.**
Sides of face broadly white.
White line on posterior tibiæ entire.
Wings smoky, sometimes clear at base...49. **vittifrons.**
Wings hyaline, narrowly dusky at tips.....50. **recens.**
White line on posterior tibiæ not reaching the tip; wings hyaline.....34. **subcyaneus.**
Face entirely white; wings hyaline.....52. **jejunus.**
Metathorax with two white spots behind.....53. **sublatus.**
Apex of abdomen fulvous, venter and narrow lateral margins of dorsal segments yellowish.....63. **ventralis.**
Postpetiole with white spot or band at tip.
Scutellum white only on lateral margins; abdomen blue...23. **cæruleus.**
Scutellum white; abdomen black.
Metathorax immaculate.....54. **Azotus.**
Metathorax with lateral white spot.....55. **infidelis.**
Posterior legs black, their coxæ, femora and tibiæ marked with white.
Scutellum white only on lateral margins; abdomen blue; metathorax marked with white.....24. **pulcher.**
Scutellum white; abdomen black; metathorax immaculate...61. **ornatipes.**
Posterior legs ferruginous.
Posterior coxæ ferruginous, tips of their femora, tibiæ and tarsi entirely black; form slender.
Face pale.....68. **puerilis.**
Face black.....Ambly. **illætabilis.**

Posterior coxæ black.
Apical segments of abdomen black, immaculate.
Scutellum black.
Face yellow; abdomen robust, opaque..... 66. **similaris.**
Face black; abdomen rather slender and smooth beyond second segment; wings fuscous.....67. **pedalis.**
Scutellum yellow.....**Ambly. luctus.**
Apical segment of abdomen fulvous; face yellow.....64. **apicalis.**
Apical segment of abdomen white; face black with sides narrowly pale; scutellum white posteriorly.....69. **helvipes.**

Section II.—*Abdomen black spotted or banded with white beyond first segment and before apex.*

Second segment only with two white spots.....70. **bioculatus.**
Second and third segments each with a spot on each side, and narrow apical margins of third and following segments, white.....77. **consignatus.**
All the segments narrowly margined at apex with white.
Metathorax and pleura black, with pale markings; posterior femora black; antennæ without pale annulus .....78. **albomarginatus.**
Metathorax and pleura ferruginous, with pale markings; posterior femora ferruginous; antennæ with pale annulus.....79. **Blandii.**

Section III.—*Abdomen black and yellow, sometimes varied with ferruginous.*

Apex of abdomen black, with a white spot on last segment.....74. **texanus.**
Apex of abdomen black, immaculate.
Antennæ with pale annulus.....75. **suadus.**
Antennæ without pale annulus.
Third segment with indistinct yellowish band at base; wings fuliginous; metathorax entirely black.....58. **Brontens,** var.
Third segment with broad yellow band shading into fulvous at apex; wings hyaline; metathorax white at tip.....80. **Dakota.**
Second and third segments entirely yellow.....81. **pictifrons.**
Second and third segments yellow tinged with fulvous, third segment with large blackish mark at base.....82. **bipunctatus.**
Second and third segments yellow, varied at base and apex, and sometimes centrally, with ferruginous or fuscous.....84. **versabilis.**
Second and third segments yellow, more or less black *at apex.*
Abdomen shining, postpetiole smooth and polished, gastrocœli linear; metathorax entirely black.....83. **Wilsoni.**
Abdomen opaque, postpetiole aciculated, gastrocœli transverse; metathorax generally more or less yellow.....85. **comes.**
Second and third segments yellow, more or less black *at base.*
Gastrocœli deep.
Size medium, .60 inch.....86. **trizonatus.**
Size small, .35 inch.....91. **parvus.**
Gastrocœli shallow, subobsolete.....92. **vescus.**
Second and third segments yellow, narrowly black at apex, fourth segment ferruginous, postpetiole fulvous.....100. **salvus.**
Second to fourth segments more or less yellow, sometimes also postpetiole.
Base of segments 2—4 yellow, apex black, first segment entirely black.
Gastrocœli deep, the yellow band on fourth segment interrupted medially; size rather large.....85. **comes,** var.

Gastrocœli subobsolete; the yellow band on fourth segment entire; size small.....93. **pomilius.**

Base of segments 2—4 black, apex yellow, tips of first segment yellow.

Large; pale orbital lines entire.....87. **munificus.**

Medium; pale orbital lines interrupted posteriorly.....88. **lætus.**

Small; pale orbital lines interrupted posteriorly .....91. **parvus,** var.

Apex of abdomen black margined with white or yellow.

Mesothorax black, immaculate; abdomen broad, black with yellow or whitish bands.....94. **flavizonatus.**

Mesothorax black, with median yellow spot; abdomen narrow, black, with yellow bands.....90. **zebratus.**

Mesothorax black, with two longitudinal yellow lines; abdomen narrow, slender at base, yellow with black bands.....96. **comptus.**

Mesothorax fulvous, with two longitudinal yellow lines.....95. **dictiosus.**

Apex of abdomen fulvous, sometimes marked with white or yellow.

Antennæ without pale annulus.

Postpetiole aciculated.

Segments 5 and 6 black, 7 fulvous.

First segment entirely black.....98. **inconstans.**

First segment black, yellow at tip.....99. **infucatus.**

Segments 5—7 more or less fulvous or ferruginous.

Posterior femora black.

Abdominal segments one to three black, with yellow band at apex of each.....103. **zelotypus.**

Abdominal segments two to five yellow or fulvous, narrowly black at base.....104. **creperus.**

Abdominal segments varied with yellow, ferruginous and black, segments 2 and 3 more or less yellow at base.....105. **variegatus.**

Posterior femora fulvous.

Mesothorax black or ferruginous.....106. **Grotei.**

Mesothorax black, with two yellow stripes.....107. **delicatus.**

Postpetiole punctured.....89. **mimicus.**

Antennæ with pale annulus.

Postpetiole aciculated; apical segment fulvous..... 104. **creperus,** var?

Postpetiole punctured; apical segment white.....110. **Heiligbrodti.**

Postpetiole smooth and polished; apical segments fulvous.

Posterior femora black.....108. **paratus.**

Posterior femora fulvous.....109. **vinnulus.**

Section IV.—*Abdomen fulvo-ferruginous, apical margins of segments* 1—4, *and terminal segment, yellow*.....111. **honestus.**

Section V.—*Abdomen bright saffron-yellow, the three or four apical segments black; legs entirely yellow*.....112. **milvus.**

Section VI.—*Abdomen more or less ferruginous, apex always black.*

Segment 3 ferruginous at base, remaining segments black; wings subhyaline; face, scutellum and legs yellow.....**Ambly. Quebecensis,** var.

Segments 2—4 more or less ferruginous.

Wings fuliginous.

Posterior legs black.

Scutellum black; the second and third segments of abdomen pale ferruginous.....**Ambly. magnus.**

Scutellum white; the second, third and base of fourth segments of abdomen yellowish ferruginous.....116. **Belfragei.**

Posterior legs and the second, third and fourth segments of abdomen ferruginous.....137. **rufiventris,** var?

Wings hyaline or subhyaline.

Antennæ without pale annulus.

Scutellum black.

Posterior femora black, tibiæ yellow, black at tips; four apical segments of abdomen and the head entirely black.....122. **cervulus.**

Posterior femora and tibiæ ferruginous, tipped with black: four apical segments of abdomen black; face with pale lateral margins.....123. **decoratus.**

Posterior femora and tibiæ ferruginous; two apical segments of abdomen black; face with pale lateral margins....126. **limbifrons.**

Scutellum more or less pale.

Posterior coxæ black, or black and white.

Postpetiole coarsely granulated, not longitudinally rugose; posterior coxæ black and white.....**Ambly. electus.**

Postpetiole very coarsely longitudinally rugose, also the three following segments; posterior coxæ black.....117. **procax.**

Postpetiole finely, distinctly aciculated.

Scutellum flat.

Posterior femora black; abdominal segments 2 and 3 entirely ferruginous; scutellum entirely white.....115. **restrictus.**

Posterior femora ferruginous; abdominal segments 2 and 3 ferruginous varied with fuscous or black; scutellum white only at apex.

Face black, clypeus yellow.....82. **bipunctatus,** var.

Face entirely yellow.....**Ambly. Quebecensis.**

Scutellum convex.....160. **instabilis.**

Postpetiole very finely and indistinctly sculptured; abdominal segments 2 and 3 ferruginous.....124. **lachrymans.**

Posterior coxæ ferruginous.....125. **citrifrons.**

Antennæ with pale annulus.

Apical segments of abdomen entirely black.

Posterior coxæ, trochanters and femora black.....118. **leviculus.**

Posterior coxæ, trochanters and femora ferruginous...121. **hospitus.**

Apical segments of abdomen marked with white.....120. **finitimus.**

Section VII.—*Abdomen ferruginous or fulvous, the first and base or apex of two or three following segments more or less black, apex never black.*

Wings dark fuliginous or black.

Antennæ without pale annulus.

Abdomen ferruginous, segments 1—4 more or less black at base; scutellum yellow.....142. **succinctus.**

Abdomen ferruginous, first segment only black.

Posterior legs entirely black.

Head large, subquadrate, cheeks convex.....135. **grandis.**

Head small, subtriangular, cheeks flattened.

Scutellum black; postpetiole aciculated..... 137. **rufiventris.**

Scutellum with white spot; postpetiole coarsely rugose; four anterior coxæ white beneath.....138. **placidus.**

Posterior legs black, their tibiæ with white line or spot laterally towards base; scutellum white; scape entirely black.....139. **devinctor.**
Posterior legs black, their femora and tibiæ ferruginous; scutellum black. Abdomen brown-ferruginous. .....137. **rufiventris,** var.
Abdomen and legs entirely ferruginous.
Thorax black, mesothorax, scutellum and disc of metathorax ferruginous.....148. **crudus.**
Thorax entirely ferruginous.....146. **cupitus.**
Antennæ with pale annulus.
Head and thorax black; abdomen narrow, subcylindrical, segments not constricted at base.....141. **insolens.**
Head and thorax ferruginous, metathorax and pleura sometimes blackish; abdominal segments constricted at base.....149. **trogiformis.**
Wings hyaline or subhyaline, sometimes pale ferruginous.
Antennæ without pale annulus.
Abdomen ferruginous, basal margin of segments more or less black.
Head and thorax black.
Posterior legs black, their tibiæ yellow, black at tips.
First abdominal segment entirely black.....151. **animosus.**
First abdominal segment black, yellow at apex.....104. **creperus.**
Posterior legs ferruginous; mesothorax more or less dull ferruginous.
First and base of second segments of abdomen black; metathorax entirely black.....152. **discus.**
First and second segments of abdomen entirely ferruginous; metathorax more or less marked with ferruginous.....150. **difficilis.**
Head and thorax ferruginous, pleura generally black beneath.
Gastrocœli deep, foveiform; postpetiole aciculated.....185. **longulus.**
Gastrocœli linear; postpetiole smooth and polished...186. **volens,** var.
Abdomen ferruginous, first segment only black.
Scutellum black.
Sides of face white.....158. **Saundersi.**
Face entirely yellow.....**Ambly. fraternus.**
Scutellum pale at apex; face entirely whitish.....157. **vultus.**
Scutellum entirely white or yellow.
Posterior femora black.
All the coxæ black.
Posterior trochanters white.....154. **vinulentus.**
Posterior trochanters black.....**Ambly. nubivagus.**
Four anterior coxæ white.....153. **allapsus.**
Posterior femora ferruginous.....155. **nuncius.**
Abdomen entirely ferruginous.
Posterior femora black; thorax black.....**Ambly. nubivagus,** var.
Posterior femora ferruginous; thorax mostly ferruginous.
Head black and yellow.
Mesothorax black.....176. **libens.**
Mesothorax ferruginous.....199. **utilis.**
Head ferruginous, face yellow.....191. **scibilis.**
Head entirely ferruginous.....195. **rubicundus.**
Antennæ with pale annulus.
Posterior coxæ black, or black and white.
Gastrocœli foveiform, transverse or oblique, distinct.
Abdomen immaculate, first segment except apex black.....166. **vafer.**

Abdomen with two basal segments black, apical corners of segments 1—4 with white spot.....167. **lascivus.**

Gastrocœli elongate, linear, subobsolete or wanting.

Clypeus broadly concave; abdomen fulvous, generally with fuscous spots on segments 2—4.....170. **w-album.**

Clypeus with a more or less distinct medial impression or fovea; abdomen fulvous or ferruginous, second and following segments not marked with fuscous.....171. **duplicatus.**

Clypeus flat or subconvex, not excavate medially; abdomen fulvous, generally more or less marked with fuscous.....175. **scitulus.**

Posterior coxæ ferruginous.

Abdomen with a more or less distinct blackish band.

Segments 2—4 or 5 narrowly black at base.....186. **volens.**

Segments 2 and 3 narrowly black at apex.....187. **propitius.**

Abdomen without blackish bands.

Posterior tibiæ black, with white annulus; tips of their femora and tibiæ entirely blackish.....172. **annulatus.**

Posterior legs entirely honey-yellow; their tibiæ and tarsi sometimes dusky, but never with pale annulus.

Pleura ferruginous; metathorax with two acute spines; head ferruginous, face pale, no orbital lines; posterior femora long and slender.....192. **mucronatus.**

Pleura whitish; metathorax with two short subacute spines; head with face and broad orbital lines white; posterior femora short and subrobust.....197. **facetus.**

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1. **Orpheus,** Cress. Proc. Ent. Soc. Phil. iii, p. 136, ♀.

Hab.—Mass., Pa. A large, somewhat shining, black species with no pale markings, except a white annulus on antennæ, and in one specimen a subobsolete spot on tip of scutellum; wings smoky. Length ♀ .75 inch.

The large, subquadrate head and subsinuate anterior margin of clypeus refer this and the next species to *Chasmodes*, Wesmael.

2. **saucius,** Cress. Proc. Ent. Soc. Phil. iii, p. 137, ♀; Trans. Am. Ent. Soc. i, p. 293.

Hab.—Pa., N. C. A shining black, immaculate species, with a large subquadrate head; antennæ with a broad white annulus; wings fuliginous; anterior margin of clypeus sinuate. Length ♀ .60 inch.

3. **maurus,** Cress. Proc. Ent. Soc. Phil. iii, p. 135, ♀.

Hab.—Va., N. C., Ga. A large dull black species with blackish violaceous wings, and scabrous postpetiole; antennæ with a broad white annulus. A specimen from N. C. has a short white line in front of tegulæ wanting in other specimens. Length ♀ .76 inch.

4. **germanus**, n. sp.

♀.—Dull black, mesothorax, scutellum and apex of abdomen shining; a short line on upper anterior orbits, spot at summit of eyes, broad annulus on antennæ, interrupted beneath and dot beneath tegulæ white; the four or five basal joints of flagellum subequal and about twice longer than broad; scutellum slightly convex, sparsely and rather strongly punctured, sometimes with two pale spots at tip; central area of metathorax subtriangular with anterior angle rounded; wings uniformly blackish-fuliginous; posterior coxæ with a small patch of dense black pubescence at tip beneath; abdomen fusiform, densely and rather strongly punctured on second and third segments, gradually less strongly so on remaining segments; first segment finely longitudinally aciculated at tip; gastrocœli large and deep. Length .65 inch.

Hab.—Mass., W. Va., (Ridings). Closely allied to *maurus* which however has the apex of first abdominal segment scabrous and basal middle of second segment longitudinally striated.

5. **viola**, Cress. Proc. Ent. Soc. Phil. iii, p. 137, ♀; Trans. Am. Ent. Soc. i, p. 292.

Hab.—Can., Pa., Va., Ill., Ga., Tex. This is a shining black, immaculate species with dark fusco-violaceous wings, and readily distinguished by the punctured postpetiole; antennæ with rather broad white annulus. Length ♀ .55—.65 inch.

6. **malacus**, Say, Contrib. Macl. Lyc. i, p. 72.

afer, Cress. Proc. Ent. Soc. Phil. iii, p. 138, ♀.

Hab.—Can., N. Y., N. J., Pa., Ill. A dull black, immaculate species, with fuliginous wings and broadly fusiform abdomen; pale annulus on antennæ rather broad. The gastrocoeli are shallow and rugose. Length ♀ .50—.60 inch.

7. **cincticornis**, Cress. Proc. Ent. Soc. Phil. iii, p. 139, ♀.

Hab.—Can., Mass., Pa., Ill., N. C. A slender dull black, immaculate, dark winged species of which *galenus* is probably the male; antennæ with a broad white annulus. The tuberculiform pubescent patch on posterior coxæ will readily distinguish this species. Length ♀ .50—.60 inch.

8. **galenus**, Cress. Trans. Am. Ent. Soc. Phil. i, p. 292, ♂.

Hab.—Can., Mass., Pa., Va., Ill. A narrow, elongate, dull black, immaculate species, with broad yellowish annulus on antennæ and fuliginous wings. Length ♂ .60—.67 inch.

Probably the ♂ of *cincticornis*.

9. **torvinus**, Cress. Trans. Am. Ent. Soc. i, p. 292, ♂.

Hab.—Illinois. A rather large dull black immaculate species with narrow pale annulus on antennæ and fuliginous wings. Length ♂ .70 inch.

This and *citimus* may be sexes of the same species.

10. **citimus**, n. sp.

♂.—Deep black; sides of face, dot on each side of clypeus, labrum, spot on mandibles, palpi except base, scape beneath, narrow interrupted annulus on middle of antennæ and line on four anterior tibiæ in front, white; antennæ long, slender at tips; thorax rather shining; disc of mesothorax sparsely punctured; scutellum convex and strongly punctured; metathorax coarsely rugose, excavated posteriorly, central area semicircular; wings blackish-fuliginous, paler in middle of costal cells and at apex; legs slender; abdomen opaque, rather shining at tip; apex of first segment moderately broad and coarsely longitudinally aciculated, second and following segments confluently punctured, gradually less strongly so towards apex, base of second longitudinally rugose, gastrocoeli large and very deep. Length .70 inch.

Hab.—White Mts., N. H., (Austin). Allied to *torvinus*, which has much shorter antennæ and the four anterior tibiæ annulated at base with white.

11. **centrator**, Say, Am. Ent. pl. 22, ♀.

fortis, Prov. Nat. Can. vii, p. 79, ♀.

Hab.—Can., Pa., N. C. A large dull black species, with dark fuscous wings and at once recognized by the reddish-brown head, mesothorax and scutellum; annulus on antennæ very broad and yellowish. Length ♀ .70 inch.

This is probably the ♀ of *flavicornis*.

12. **flavicornis**, Cress. Proc. Ent. Soc. Phil. iii, p. 140, ♂.

Hab.—Can., N. Y., Pa. A large dull black immaculate species, with fulvous-yellow antennæ and fuliginous wings. Length ♂ .70 inch.

Probably the ♂ of *centrator*.

13. **solitus**, Cress. Proc. Cal. Acad. Nat. Sci. 1877, ♀.

Hab.—Colorado; Brit. Columbia. A small immaculate black species with purplish-blue abdomen and smoky wings; pale annulus on antennæ rather narrow. The postpetiole is punctured, and gastrocoeli small, punctiform. Length ♀ .30—.43 inch.

14. **scriptifrons**, n. sp.

♂.—Dull black; face more or less white, sometimes with only upper margin irregularly white; clypeus sometimes with two oblique white marks; antennæ with a white annulus; a short white line before tegulæ; tegulæ subconvex, punctured; metathorax obliquely truncate behind, lateral angles spiniform, central area small, semicircular or subquadrate; wings tinged with fuscous;

legs slender, four anterior knees and their tibiæ in front white; abdomen opaque, first segment subopaque, not broad at tip and finely roughened or aciculate, second and third segments densely punctured, fourth less densely so and remaining segments smooth and shining; base of second segment depressed, rugose, gastrocoeli large, shallow, coarsely rugose; apical margin of second and third segments narrowly and subobsoletely dull ferruginous. Length .60 inch.

Hab.—Canada, (Pettit, Saunders).

15. **macilentus,** Cress. Proc. Ent. Soc. Phil. iv, p. 249, ♂.

Hab.—Colorado. A long, narrow species, with the body dull opaque black, except the mesothorax, thorax beneath and scutellum, which are shining, the latter polished and impunctured; head small; face, anterior orbits, clypeus, except a brown spot on its anterior middle, mandibles and palpi, lemon-yellow; the antennæ are very long, slender, tapering to a fine point at tip, dull black, basal joint beneath spotted with yellowish; wings yellowish-hyaline; legs black, coxæ more or less yellow beneath, anterior and intermediate legs mostly yellow, posterior tibiæ with a yellow band at base beneath, and their tarsi yellowish-fuscous; abdomen long and narrow, immaculate. Length ♂ .60 inch.

16. **corvinus,** n. sp.

♀.—Small, black, shining, feebly punctured; antennæ robust, thickened at tip, a narrow white annulus at about the middle, joints three and four short, subequal, not twice longer than broad; scutellum flat, broad at tip, sparsely punctured; metathorax with upper face flattened, truncate behind and excavated medially, upper angles prominent, tuberculiform, central area large elongate-truncate, extending the entire length of upper face; wings subhyaline; legs robust, femora swollen, four anterior tibiæ and all the tarsi more or less tinged with rufous, all the tibiæ with a large white spot on outer side rather above the middle, posterior coxæ with a small brown pubescent patch at tip beneath; abdomen broadly fusiform, second segment sparsely and more strongly punctured than the third, gastrocoeli small, subobsolete; first segment gradually and rather broadly dilated at tip which is shining and indistinctly aciculated. Length .35 inch.

Hab.—White Mts., N. H., (Morrison).

17. **odiosus,** Cress. Proc. Cal. Acad. Nat. Sci. 1877, ♂.

Hab.—California. A subrobust rather shining black species with entirely black antennæ and a pale spot on each side before the wings; the wings are slightly smoky, and the abdomen is faintly tinged with blue. Length ♂ .60 inch.

18. **saevus,** Cress. Trans. Am. Ent. Soc. i, p. 296, ♀.

Hab.—Illinois. The body is entirely black, except a faint pale line at tip of scutellum and two conspicuous white spots at tip of abdomen. The antennæ have a broad white annulus and the wings

are clear; postpetiole smooth and shining with apex punctured. Length ♀ .47 inch.

19. **ater**, Cress. Proc. Ent. Soc. Phil. iii, p. 138, ♀.

Hab.—New York. A medium size black species, immaculate except pale line on anterior orbits and dot before tegulæ; antennæ with rather broad white annulus and wings faintly smoky; scutellum quite flat and deeply punctured; postpetiole narrow and minutely aciculated; second and third segments of abdomen densely punctured, the former coarsely aciculated between the gastrocoeli, which are large and deep. Length ♀ .57 inch.

20. **apertus**, Cress. Trans. Am. Ent. Soc. i, p. 293, ♀.

Hab.—Can., Ct., N. Y., Ill. Closely resembles *ater*, but rather smaller, with longer antennæ and larger head, and easily separated by the punctured postpetiole and less strongly sculptured abdomen. One specimen from Illinois has the apical margin of scutellum pale. Length ♀ .50 inch.

21. **acerbus**, Cress. Trans. Am. Ent. Soc. i, p. 293, ♂.

Hab.—Can., N. H., Mass., Ill. A rather small, slender, immaculate black species with narrow pale annulus on antennæ, and hyaline wings. Length ♂ .35—.50 inch.

22. **chalybeus**, n. sp.

♀—.Black, shining; metathorax and abdomen steel-blue; upper anterior orbits, interrupted on each side of ocelli, annulus on antennæ and anterior tibiæ in front, white; antennæ conspicuously flattened towards apex, third joint twice longer than broad and longer than the fourth; scutellum flat and sparsely punctured; metathorax opaque, strongly punctured, nearly smooth at base, deeply excavated behind, central area small, quadrate, anterior margin indistinct; wings slightly tinged with brown, areolet smaller than usual, nearly triangular; posterior coxæ and femora tinged with blue, their coxæ nude beneath and strongly punctured; abdomen brilliant steel-blue, smooth and polished at apex, segments two to four with small deep punctures becoming confluent on disc; first segment broadly dilated at apex and coarsely punctured; basal middle of second segment longitudinally striated, gastrocoeli large and deep. Length .65 inch.

Hab.—Massachusetts, (Ridings). Closely allied to *cæruleus* which, however, has a distinct pubescent patch on underside of posterior coxæ.

23. **cæruleus**, Cress. Proc. Ent. Soc. Phil. iii, p. 149. ♀.

Hab.—Can., Mass., Pa., N. J., Md., Va., Ill., Ga., Tex. Easily known by the beautiful steel-blue color of the abdomen, and sometimes of the whole body. The ♂ has the abdomen much more coarsely sculptured and more or less opaque and consequently of a less brilliant

blue color; the face and clypeus are entirely white, as well as the scape beneath, and in two specimens from Ga., the posterior femora have a broad white stripe on outer side. The postpetiole has a white spot on each side at tip, sometimes subobsolete or wanting. A single ♀ from Va., has the body entirely of a brilliant steel-blue color, with no pale markings excepting narrow, interrupted orbital lines and a dot on each side of scutellum. Length ♂ ♀ .45—.70 inch.

24. **pulcher**, Brullé, Hym. p. 304.

Hab.—Can., N. Y., La. This handsome species is closely allied to *cæruleus*, but is more robust, the thorax and legs much more elaborately ornamented with white, and the posterior coxæ of ♀ are destitute of the pubescent scopa seen in *cæruleus*. Length ♂ ♀ .65 inch.

25. **navus**, Say, Bost. Jour. Nat. Hist. i, p. 229.

cinctipes, Prov. Nat. Can. vii, p. 51, ♀.

Hab.—Can., Pa., Md., Ill. A rather small species, with a more or less bluish tinge on the abdomen; the orbits, spot on each side of clypeus, palpi, annulus on antennæ, collar, sutural line in front of wings, a line on each side of scutellum, spot on four anterior coxæ beneath, all the trochanters, an annulus on the tibiæ at base and another on base of tarsi, all white; coxal scopa distinct; wings hyaline. The male has the face, clypeus and all the coxæ entirely white; flagellum entirely black. Length ♂ ♀ .40—.45 inch.

26. **scelestus**, Cress. Proc. Ent. Soc. Phil. iii, p. 148, ♀.

Hab.—Illinois. Only a single specimen of this distinct species has been observed. It is easily distinguished by the short antennæ, uniform dark fuscous wings and smooth finely punctured abdomen. The antennæ have a white annulus; a spot on scutellum and two spots at tip of abdomen are the only pale markings of the body. The postpetiole is smooth on the disc and punctured on the sides; coxal scopa distinct. Length ♀ .50 inch.

27. **caliginosus**, Cress. Proc. Ent. Soc. Phil. iii, p. 144, ♀.

Hab.—Col., Ill. A dull black species, with white scutellum, broad white annulus on antennæ and fuliginous wings. The head is narrowed towards the mouth. Length ♀ .55 inch.

28. **histricus**, Cress. Trans. Am. Ent. Soc. i, p. 294, ♂.

Hab.—West Virginia. A large dull black species, with fuliginous wings. Sides of face and of clypeus, annulus on antennæ, scape beneath, line before wings and scutellum whitish. Length ♂ .75 inch.

29. **agnitus**, Cress. Proc. Ent. Soc. Phil. iii, p. 151, ♀.

Hab.—Del., Ill., Tex. The abdomen of this species has a faint bluish tinge; the orbits, two dots on clypeus, a broad white annulus on antennæ, line before wings, spot on scutellum and spot or line at tip of postpetiole are all white; postpetiole punctured; wings subhyaline; coxal scopa distinct, whitish. Length ♀ .56 inch.

30. **pepticus**, n. sp.

♂.—Large, black, rather shining, face, except black central stripe dilated on clypeus, orbits, interrupted behind summit of eyes, sides of clypeus, base of mandibles, palpi, scape beneath, upper margin of prothorax, spot on tegulæ, line beneath, spot on scutellum, sometimes a dot behind, spot on four anterior coxæ beneath, line on four anterior femora and their tarsi beneath, and sometimes a spot at tip of first abdominal segment, all white or yellowish-white; wings subhyaline, smoky on apical half; postpetiole longitudinally rugose; gastrocoeli large and deep. Length .75—.80 inch.

Hab.—N. J., Ill. This may prove to be the ♂ of *Orpheus*. It differs from *vittifrons* chiefly by the immaculate posterior tibiæ.

31. **pervagus**, n. sp.

♂.—Black, subopaque, abdomen tinged with blue; face entirely, clypeus except central black spot, base of mandibles, orbits, palpi, scape beneath, collar, upper margin of prothorax, tegulæ, short line beneath, spot on scutellum, four anterior coxæ more or less beneath and their femora and tibiæ beneath, white; wings faintly tinged with fuscous; abdomen densely punctured, smooth at tip, postpetiole and base of second segment longitudinally rugose, gastrocoeli large and deep. Length .63 inch.

Hab.—Canada, (Pettit).

32. **citatus**, Prov. Nat. Can. ix, p. 8, ♂.

Hab.—Can., N. H. A slender black species, with sides of face, annulus on antennæ, scutellum and spot at tip of abdomen white; wings hyaline, faintly clouded at apex; postpetiole smooth and polished; gastrocoeli large and deep. Length ♂ .52 inch.

33. **merus**, n. sp.

♂.—Black, subopaque; orbits broad on face and interrupted behind summit of eyes, sides of clypeus, spot on base of mandibles, scape beneath, broad annulus on antennæ, collar, upper margin of prothorax, spot on tegulæ, short line beneath, scutellum, sometimes spot behind, round spot on flanks of metathorax, spot on anterior coxæ, line on their femora beneath, four anterior tibiæ beneath, apical margin of first abdominal segment, sometimes a small spot on each side of second segment at tip and apical margin of sixth or seventh segments more or less, white; wings hyaline, faintly dusky at apex; postpetiole narrow, smooth and shining, second and third segments densely punctured, roughly so on base of second, gastrocoeli large and deep. Length .52 inch.

Hab.—Mass., Va., (Ridings). It is probable that specimens of this species will occur with apical margins of all the abdominal segments more or less white.

34. **subcyaneus**, Cress. Proc. Ent. Soc. Phil. iii, p. 148, ♀.
pullatus, Cress. Proc. Ent. Soc. Phil. iii, p. 146, ♂.

Hab.—Can., Me., Mass., N. Y., N. J., Pa., Del., Ga., Ill., Col., Tex. The abdomen of this species is more or less strongly tinged with blue or purple, and is finely punctured and shining, the postpetiole broad and punctured and the gastrocoeli small and moderately deep. Annulus on antennæ and scutellum white; wings subhyaline. The ♂ has the sides of the face and clypeus, orbits, tegulæ, line before, scutellum, dot behind, tips of four anterior femora and line on all the tibiæ, white; the flagellum is entirely black; the abdomen longer and narrower. Length ♂ ♀ .35—.60 inch.

35. **neutralis**, Cress. Proc. Cal. Acad. Nat. Sci. 1877, ♂.

Hab.—California. This has much the appearance of a large specimen of *subcyaneus* ♂, but the scape beneath and the posterior legs are entirely black. Length ♂ .65 inch.

36. **vitalis**, n. sp.

♀.—Black, abdomen tinged with blue and shining at tip; orbits of eyes, dilated towards mouth, lateral angles of clypeus, palpi, annulus on antennæ, interrupted beneath, collar, upper margin of prothorax, short line beneath tegulæ, two short lines on disc of mesothorax, large square spot on scutellum, spot on four anterior coxæ and trochanters beneath, extreme tips of their femora and anterior tibiæ in front, all white; antennæ flattened towards apex, third joint more than twice longer than broad and slightly longer than fourth; scutellum flat, sparsely punctured and broadly truncate at tip; central area of metathorax transversely semicircular, not well defined; wings clear hyaline; femora robust, posterior coxæ beneath nude and finely punctured, tibial spurs whitish; abdomen fusiform, slightly tinged with blue, finely punctured, apical segments smooth and shining; first segment broadly dilated at tip, longitudinally aciculate and sparsely punctured; basal middle of segments two and three longitudinally striated; gastrocoeli very large and deep. Length .43 inch.

Hab.—New York. Allied to *subcyaneus* but very distinct by the ornamentation of the head and the stronger sculpturing of the abdomen.

37. **mendax**, n. sp.

♀.—Black, subopaque, finely punctured; rather broad anterior orbits extending from summit of eyes to a little below antennæ, palpi, narrow annulus on antennæ, collar, upper margin of prothorax, short line beneath tegulæ, square spot on scutellum, tips of anterior femora and their tibiæ in front, white; antennæ rather stout, with third joint more than twice longer than broad and distinctly longer than fourth; scutellum flat, polished, feebly punctured, broadly truncate at tip; metathorax coarsely punctured, central area large subquadrate with sides rounded, posterior face broadly, not very deeply excavated; wings hyaline; femora rather stout, posterior coxæ nude beneath, finely and closely punctured, tibial spurs pale; abdomen fusiform, segments two and three closely and finely punctured, remaining segments indistinctly

punctured and shining: first segment gradually, not broadly dilated at tip which is finely longitudinally aciculated; gastrocoeli small and deep. Length .40 inch.

Hab.—Can., Mass. Differs from *subcyaneus* by the more slender form, by the black and more closely and finely punctured abdomen, and by the narrower and finely aciculated postpetiole.

38. **bimembris**, Prov. Nat. Can. ix, p. 8, ♀.

Hab.—Canada. A medium sized, robust, dull black species, with no pale markings on body except the scutellum and two spots at apex of abdomen; the antennæ have each a broad yellowish-white annulus, and the wings are uniformly pale yellowish-fuscous. Length ♀ .50 inch.

39. **truculentus**, n. sp.

♀.—Opaque black, strongly and confluently punctured; upper anterior orbits, annulus on antennæ, short line before and one beneath tegulæ, scutellum entirely and large spot on disc of three apical segments of abdomen, white; antennæ robust, strongly involute, third joint scarcely twice longer than broad, and longer than the fourth which is nearly square; cheeks confluently punctured and flattened; scutellum broad, flat, sparsely punctured, rapidly narrowed to tip which is truncate; metathorax deeply excavated behind, central area long, subquadrate; wings uniformly yellowish-fuliginous; legs robust, tarsi rufo-fuscous, four anterior tibiæ tinged with brown, the anterior pair and tips of femora pale rufo-fuscous in front, posterior coxæ nude beneath and strongly punctured; abdomen closely and strongly punctured on segments two and three, confluently so on middle and base of third segment, apical segments gradually less strongly punctured; first segment broadly dilated at tip and longitudinally aciculated; gastrocoeli rather large and very deep. Length .45 inch.

Hab.—White Mts, N. H., (Austin). Stouter and more coarsely sculptured than *brevicinctor* which it somewhat resembles.

40. **brevicinctor**, Say, Am. Ent. pl. 22.

Hab.—Can., Mass., N. J., Del., Md., Col. A small, slender, dull black species with pale annulus on antennæ, white scutellum and two white spots at apex of abdomen; wings subhyaline. Closely allied to *extrematatis* which has the basal joint of posterior trochanters white; in this species it is black. Length .35—.50 inch.

41. **extrematatis**, Cress. Proc. Ent. Soc. Phil. iii, p. 149, ♀.

Phygadeuon niger, Prov. Nat. Can. vi, p. 280, ♀.

Hab.—Can., N. H., Mass., Ill., La. A small dull black species, with annulus on antennæ, scutellum, *basal joint of posterior trochanters*, and spot at tip of abdomen, white; wings smoky; coxal scopa ♀ distinct. Length ♂ ♀ .38—.48 inch.

42. **atrox**, n. sp.

♀.—Robust, black, opaque, mesothorax, scutellum and apex of abdomen shining; annulus on antennæ, scutellum, anterior tibiæ, intermediate pair except tip, broad annulus on posterior pair, and spot on middle of two apical segments of abdomen, white; antennæ short, stout, strongly involute, third joint not twice longer than broad and longer than fourth which is nearly quadrate, apical joints attenuated; upper anterior orbits narrowly reddish; mesothorax confluently punctured; scutellum broad, flat, polished, impunctured, apex truncate; metathorax opaque, rugose, posterior face rather deeply excavated, lateral carina prominent, central area large, quadrate; wings uniformly brown, stigma yellowish-brown, nervures black; legs rather robust, four anterior tarsi more or less brown, posterior coxæ pubescent beneath, but without a distinct scopa; abdomen elongate-ovate or broadly fusiform; first segment rather broadly dilated at tip and longitudinally aciculated; second and third segments closely punctured, strongly so at base of second and more feebly on third and following segments; gastrocœli moderately large and deep. Length .70 inch.

Hab.—Canada. A very distinct species.

43. **stygicus.**

signatipes, Prov. (nec *Cress.*), Nat. Can. vii, p. 52, ♀.

Hab.—Can., Mass. This is a robust black species with smoky hyaline wings; annulus on antennæ, scutellum, annulus at base of all the tibiæ, and spot at apex of abdomen, white; the coxal scopa distinct. Length ♀ .50 inch.

44. **pilosulus**, Prov. Nat. Can. vii, p. 25, ♀.

Hab.—Can., Mass. A subrobust black species, with no other markings except a white annulus on flagellum and a white spot near base of all the tibiæ; wings clear; postpetiole narrow, punctured; gastrocœli subobsolete, feebly indicated, second and base of third segments closely punctured, remainder impunctured, shining. Length ♀ .45 inch.

45. **pravus**, n. sp.

♀.—Dull black, mesothorax, scutellum and apex of abdomen shining; upper anterior orbits, palpi, narrow annulus on antennæ, narrow upper margin of prothorax, sometimes interrupted spot beneath tegulæ, sometimes apex of scutellum and elongate spot on outer side of all the tibiæ, white; clypeus and mandibles more or less tinged with ferruginous; antennæ short, stout, with short robust joints, third and fourth joints equal in length and each about one and a half times longer than wide; mesothorax and scutellum sparsely punctured and polished, the latter flat and broadly rounded behind; metathorax opaque, scabrous, posterior face deeply excavated, lateral angles prominent, central area elongate subquadrate, rounded anteriorly; wings faintly tinged with brown; legs short, robust, femora swollen, tips of anterior femora, their tibiæ and tarsi tinged with ferruginous, posterior coxæ beneath nude, sparsely punctured; abdomen oblong-ovate; first segment rather broadly dilated at apex, with the surface even and finely roughened; second segment closely and finely

punctured more sparsely so toward apex, gastrocoeli shallow and longitudinally striated; third and following segments sparsely punctured or smooth and shining. Length .40—.45 inch.

Hab.—Can., (Pettit); Mass., (Ridings). Closely allied to *sagus* and *pilosulus;* from the former it differs by the posterior coxæ beneath being destitute of the pubescent patch, and from *pilosulus* by the much stouter legs, and from both by the shorter and stouter basal joints of the flagellum.

46. **sagus,** Cress. Trans. Am. Ent. Soc. i, p. 294, ♀.

Hab.—Illinois. A shining black species, with annulus on antennæ, line on posterior orbits ♀, all beneath antennæ, orbits and scape beneath ♂, dot or line before tegulæ, spot on scutellum, and line on all the tibiæ, white; wings clear or faintly dusky; coxal scopa ♀ very large, covering nearly the entire under surface. Length ♂ ♀ .45—.55 inch.

The ♂ described with ♀ of this species, proves to belong to a new species next described (*promptus*), and differs from the true ♂ of *sagus* principally by the scape being entirely black and the posterior tibiæ having an entire white annulus.

47. **promptus,** n. sp.

♀.—Black, mesothorax, scutellum and apex of abdomen shining; annulus on antennæ, scutellum and rather broad annulus on all the tibiæ interrupted on two anterior pairs, white; upper anterior orbits sometimes narrowly reddish; cheeks swollen; antennæ short, robust, with short, thick joints, third joint about one and a half times longer than broad and subequal with the fourth, the joints beyond annulus thickened; mesothorax sparsely punctured; scutellum broad, flat, with a few scattered punctures, broadly truncate at tip, metathorax strongly punctured, posterior face broadly not deeply excavated, lateral angles prominent, central area nearly quadrate; wings tinged with fuscous, rather darker at tips; legs robust. femora short, swollen, tips of anterior tibiæ and their tarsi brown, apex of posterior coxæ beneath with a patch of short dense brown pubescence; abdomen oblong ovate, second segment closely and finely punctured, sparsely so at tip, third indistinctly punctured and remaining segments smooth and shining; first segment broadly dilated at apex and sparsely punctured; gastrocoeli subobsolete. Length .46 inch.

♂.—Face entirely, clypeus, spot on mandibles, palpi, orbits interrupted anteriorly below ocelli and more or less on the cheeks, a narrow annulus on antennæ, collar, upper margin of prothorax, short line beneath tegulæ, scutellum, four anterior tibiæ more or less and a broad annulus on posterior tibiæ, all white; scutellum rather convex; elevated lines on metathorax sharply defined, the central area rounded anteriorly; wings darker at apex than in female; abdomen more densely punctured, apex of first segment narrow, base of second rugose, the gastrocoeli large, not deep but coarsely rugose; body, antennæ and legs much more slender than in female. Length .55 inch.

Hab.—Mass., (Ridings); White Mts., N. H., (Morrison). Separated at once from *sagus* by the white annulus on posterior tibiæ

being entire and not interrupted behind; the basal joints of the flagellum are shorter and stouter. In *sagus* ♀ the pubescent patch on posterior coxæ covers nearly the entire under surface. In *sagus* ♂ the scape beneath is white, while in *promptus* it is black.

48. **vagans**, Prov. Nat. Can. vii, p. 51, ♂.

Hab.—Canada. Slender, black, shining; face, clypeus, mandibles, palpi, orbits, slightly interrupted, annulus on flagellum, scape beneath, margins of prothorax, line beneath wings, tegulæ, scutellums, four anterior coxæ and trochanters and legs in front, all white; posterior tibiæ pale, black at tips, tarsi dusky, pale at base of joints; wings hyaline; postpetiole flattened, indistinctly sculptured; gastrocoeli indicated by a rugosity, not deep. Length ♂ .40—.45 inch.

49. **vittifrons**, Cress. Proc. Ent. Soc. Phil. iii, p. 143, ♂.

Hab.—Del., Va., Ga. A beautiful species, of rather large size, shining black, with the orbits, face except a broad black stripe down the middle, spot on each side of clypeus, mandibles, palpi, scape beneath, tegulæ, a line before and a short one beneath, scutellum more or less, a small spot behind, four anterior coxæ beneath, most of their tibiæ and tarsi, a line on their femora at tips within, tips of all the femora and a line on the posterior tibiæ exteriorly, all white; antennæ long, slender at tips, the flagellum entirely black; wings fuliginous, with a brilliant purplish reflection, sometimes conspicuously hyaline or subhyaline at base; abdomen slightly tinged with blue, shining, rather closely and uniformly punctured, postpetiole punctured. Length ♂ .70—.75 inch.

50. **recens**, n. sp.

♂.—Slender, black, rather shining; orbits, slightly interrupted at summit of eyes, face except a black spot on middle forming a stripe and extending to tip of clypeus, sides of clypeus, spot on mandibles, palpi, scape beneath, upper margin of prothorax, two short lines on disc of mesothorax, tegulæ, short line beneath, scutellum, dot behind, a dot on each side before, spot on four anterior coxæ beneath, stripe on their femora, their tibiæ and tarsi in front, tips of posterior femora, a line on entire length of their tibiæ behind and a stripe on basal joint of their tarsi, all white; wings hyaline, fuliginous on apical margin; abdomen tinged with purple, closely punctured, especially at base of segments, postpetiole sparsely punctured, gastrocoeli large and deep. Length .62 inch.

Hab.—West Virginia, (Ridings).

51. **cordatus**, Cress. Proc. Ent. Soc. Phil. iii, p. 146, ♂.

Hab.—Colorado. A rather slender black species, with the abdomen tinged with purple; the wings subhyaline, darker at tips; anterior orbits (very narrow above the antennæ and squarely emarginate on

each side just above the clypeus), a spot on each side of clypeus, spot on mandibles, palpi, spot on tegulæ, another in front and a line beneath, a cordate spot on scutellum, tips of four anterior femora, their tibiæ and tarsi within, and a stripe on posterior tibiæ at base, all white; postpetiole suddenly dilated, punctured and shining. Length ♂ .50 inch.

52. **jejunus.**

Ischnus jejunus, Cress. Proc. Ent. Soc. Phil. iii, p. 186, ♂.

Hab.—Mass., N. Y., Ill. A slender black species, with a faint bluish tinge on abdomen, the postpetiole of which is narrow and nearly smooth; the face entirely, clypeus, orbits, scape beneath, tegulæ, line before and short one beneath, two short lines on disc of mesothorax, scutellum, spot on four anterior coxæ beneath, their trochanters, four anterior legs in front and line at base of posterior tibiæ behind, all white; wings hyaline. Length ♂ .50—.60 inch.

53. **sublatus.**

Ischnus sublatus, Cress. Proc. Ent. Soc. Phil. iii, p. 186, ♂.

var. *Ischnus proximus*, Cress. id. p. 187, ♂.

Hab.—Can., N. H., Mass., Pa., Va., Ill. This is a slender rather shining, black species, with the face, orbits, clypeus, mandibles, palpi, scape beneath, upper margin of prothorax, tegulæ, line beneath, sometimes a spot on disc of mesothorax, scutellum, spot behind, two spots on metathorax behind, four anterior coxæ, their femora within, their tibiæ and tarsi entirely, sometimes a spot at tip of posterior coxæ beneath, basal half of their tibiæ, and base of their tarsi, all white; antennæ very long and slender; wings hyaline; abdomen narrow, cylindrical, postpetiole narrow, smooth and shining; gastrocoeli shallow. Length ♂ .50—.60 inch.

The variety *proximus* has a whitish annulus on flagellum a little beyond the middle, the hind coxæ are black beneath, but almost entirely white above, and the postpetiole has two white spots or a band at tip.

54. **Azotus**, Cress. Proc. Ent. Soc. Phil. iii, p. 150, ♂.

Hab.—Mass., Del., Va. This very pretty species has a slender form, and rather large head. It is of a dull black color, the abdomen which is cylindrical, having a decided bluish tinge; the wings clear, slightly clouded at tips; the face, broad orbits, clypeus, mandibles, palpi, scape beneath, upper margin of prothorax, two short lines on disc of mesothorax, tegulæ, line beneath, scutellum, spot behind, four

anterior coxæ, and trochanters, their femora at tips and beneath, their tibiæ and tarsi in front, a line on posterior tibiæ and tarsi exteriorly, and *a trilobed band at tip of postpetiole*, all white; the scutellum is flat; the postpetiole sparsely punctured, shining, second, third and fourth segments densely punctured; gastrocoeli large and very deep. Length ♂ .55—.65 inch.

55. **infidelis,** Cress. Trans. Am. Ent. Soc. i, p. 296, ♂.

Hab.—Mass., Ct. A rather large subrobust black species, with abdomen tinged with blue towards apex which is smooth and shining, while the second, third and fourth segments are longitudinally striated on the middle; the head and thorax are marked as in *Azotus*, except that the clypeus has a central black spot, the pleura has two white spots beneath wings, the anterior one transverse, the posterior one round, and the flanks of metathorax have a large rounded white spot; wings clear; antennæ long, entirely black; postpetiole broadly white at tip, and the third segment is stained with dull yellow on apical margin; the legs are considerably ornamented with white, the posterior femora having a white stripe *above*, which is unusual. Length ♂ .60 inch.

56. **unifasciatorius,** Say, Am. Ent. pl. 22.

niger, Brullé, Hym. p. 302.

Hab.—Can., Mass., Pa., Md., Ga., Ill. This common species is of a deep dull black color, the abdomen of ♀ often slightly tinged with blue; anterior orbits, annulus on antennæ, tegulæ, a line before and short one beneath, scutellum and sometimes a spot behind, a stripe on all the tibiæ exteriorly and tip of postpetiole, all white; the ♂ has the face white, generally more or less marked with black, and the clypeus is white, marked with black at tip; in the ♀ the face is black, with the orbits only narrowly white; wings of ♀ are clear, of the ♂ more or less smoky at tips and sometimes uniformly fuscous and violaceous. One ♂ from Canada has the face entirely black except four white spots arranged in a transverse line immediately beneath the antennæ and the clypeus black with a white spot on each side. Length ♂ ♀ .50—.65 inch.

57. **otiosus,** Say, Contrib. Macl. Lyc. i, p. 69.

Hab.—Can., Pa., N. J., Del., Ill. Closely resembles *unifasciatorius* ♀, but at once distinguished by the round white spot on flanks of metathorax, and the two short white lines on disc of mesothorax. Length ♀ .50—.63 inch.

58. **Bronteus**, Cress. Proc. Ent. Soc. Phil. iii, p. 144, ♂.

Hab.—Can., Pa., Va., Ga. A dull black species with dark wings; the face, scape beneath, tegulæ, scutellum, most of four anterior legs, posterior tibiæ except tips and their tarsi, all yellow. The type has the abdomen entirely black except a subobsolete yellowish spot on each basal corner of third segment, specimens however occur in which these spots gradually enlarge until they form a subobsolete dull yellowish band not only on third segment but also at base of second, and in this respect closely resemble dull colored specimens of *comes*—an extremely variable species. Length .65 inch.

59. **audax**, Cress. Proc. Ent. Soc. Phil. iii, p. 143, ♂.

Hab.—Colorado. This is a deep black opaque species, with the face, scape beneath, scutellum, tips of four anterior femora, their tibiæ and tarsi entirely and basal half or two-thirds of posterior tibiæ and their tarsi white or yellowish-white; wings subhyaline. The abdomen is very densely sculptured especially at base of second segment, and becoming, as is generally the case, gradually less so on apical segments which are mostly impunctured. Length ♂ .55 inch.

60. **cinctitarsis**, Prov. Nat. Can. ix, p. 7.

varipes, Prov. (nec *Grav.*) Nat. Can. vii. p. 50, ♂.

Hab.—Canada. Resembles *audax* in general appearance, but has the posterior tarsi annulated with black at tips of joints, the four anterior coxæ beneath and the second joint of posterior trochanters are white; one specimen has a spot at tip of posterior coxæ beneath. Length ♂ .57—.65 inch.

61. **ornatipes**, Cress. Trans. Am. Ent. Soc. i, p. 294, ♂.

Hab.—West Virginia. This species may be easily known by all the coxæ, femora and tibiæ being white *beneath;* the legs are short and robust, especially the posterior femora; the postpetiole is narrow, shining, with a large puncture on the disc; gastrocoeli small, punctiform; wings clear. Length ♂ .55 inch.

62. **gestuosus**, n. sp

♀.—Small, black, very closely and finely punctured; broad annulus on antennæ, scutellum and spot on middle of two apical segments of abdomen, white; sometimes there is a pale dot on each side of antennæ and a white spot before and beneath tegulæ and on outer side of four anterior coxæ; mandibles, four anterior knees, and tibiæ in front, base of posterior tibiæ, and all the tarsi more or less dull ferruginous; antennæ rather slender, attenuated at tip, third joint twice longer than wide and longer than fourth which is equal with fifth; scutellum slightly convex, polished, sparsely punctured; metathorax obliquely truncated behind, with sharp lateral carina, central area large, quadrate; wings

tinged with fuscous at tips; legs moderately stout, tibial spurs pale, posterior coxæ beneath nude and closely punctured; abdomen oblong-ovate, shining at tip; first segment gradually and rather broadly dilated at tip and more or less distinctly longitudinally aciculate; base of second segment more sparsely and strongly punctured than remainder, gastrocoeli tolerably large and not deep, sometimes tinged with ferruginous. Length .30 inch.

Hab.—White Mts., N. H., (Morrison); Brit. Col., (Crotch). The specimen from British Columbia has base of second abdominal segment strongly tinged with ferruginous.

63. **ventralis,** Cress. Proc. Ent. Soc. Phil. iv, p. 250, ♂.

Hab.—Colorado. This is much like *apicalis*, but more slender; the tegulæ and scutellum bright lemon-yellow, as well as the nervures of the wings at base; the legs are lemon-yellow, except the posterior coxæ, their femora and tips of their tibiæ which are black; the lateral edges of abdominal segments two to five and the two apical ones entirely, are fulvous; venter entirely yellowish; wings subhyaline. Length ♂ .50—.55 inch.

64. **apicalis,** Cress. Proc. Ent. Soc. Phil. iii, p. 152, ♂.

Hab.—Colorado. A dull black species, with pale smoky subviolaceous wings and apex of abdomen fulvous; scutellum with a dull yellowish spot; face, clypeus, scape beneath, and four anterior legs in front bright lemon-yellow; coxæ black, remainder of legs pale ferruginous; mesothorax, scutellum and pleura polished. Length ♂ .55 inch.

65. **semilævis,** Cress. Proc. Ent. Soc. Phil. iii, p. 142, ♀.

Hab.—Colorado. This is a immaculate black species with mesothorax, scutellum and pleura polished and sparsely punctured; the femora robust and ferruginous; the abdomen with a faint bluish tinge, densely punctured and longitudinally rugose on basal middle of second segment, gastrocoeli deep; postpetiole longitudinally aciculated; antennæ short, robust, with a narrow pale annulus on flagellum; the face is broad and unusually short; coxal scopa distinct. Length ♀ .55 inch.

66. **similaris,** Prov. Nat. Can. vii, p. 26, ♂.

Hab.—Canada, (coll. Provancher). This rare species is black, opaque, the thorax above and laterally shining; face and clypeus yellowish-ferruginous, shining, suture and foveæ of clypeus black, also a black dot beneath antennæ; scape pale beneath; scutellum flattened, pubescent, punctured; wings hyaline, nervures black, stigma fulvous; legs fulvo-ferruginous, coxæ and trochanters black; postpetiole aciculated, gastrocoeli large and deep. Length ♂ .65 inch.

67. **pedalis**, Cress. Proc. Ent. Soc. Phil. iii, p. 141, ♂; iv, p. 249, ♀.

Hab.—Colorado. A slender, dull black, immaculate species, with smoky wings and ferruginous legs, except coxæ and trochanters which are black. Length ♂ ♀ .55 inch.

68. **puerilis**, Cress. Trans. Am. Ent. Soc. i, p. 296, ♂.

mellicoxus, Prov. Nat. Can. vii, p. 48, ♂.

Hab.—Can., Mass. A long, slender, black, immaculate species, with clear wings, long slender filiform antennæ which are black above and yellowish beneath, yellow face and pale ferruginous legs except tips of posterior femora, their tibiæ and tarsi which are black; the scutellum is generally dull ferruginous. Length ♂ .40—.50 inch.

69. **helvipes**, Cress. Trans. Am. Ent. Soc. i, p. 297, ♂ ♀.

Phygadeuon ater, Prov. Nat. Can. viii, p. 317, ♀.

Hab.—Can., Mass., Ct., Ill. A small robust, shining black species, with clear wings and short robust ferruginous legs; the orbits of ♂, apex of scutellum and tip of abdomen are white. Length ♂ ♀ .25—.35 inch.

70. **bioculatus**, n. sp.

♀.—Opaque-black; head small, cheeks flat; broad annulus on antennæ, dot before tegulæ, scutellum, anterior knees and tibiæ, intermediate tibiæ except tips, broad annulus on posterior pair and two irregularly formed spots on each side of middle of second abdominal segment, white; antennæ slender, with third joint slender and cylindrical, a little longer than fourth, the joints before apex slightly flattened; mesothorax confluently punctured; scutellum subconvex, broadly truncate at tip, the basal excavation very deep and lateral carina prominent and sharp; metathorax rugose, truncate behind, central area subquadrate, broadly rounded anteriorly; wings uniformly pale brownish, stigma boney-yellow, nervures dark; legs slender, tips of anterior tibiæ and four anterior tarsi more or less dull ferruginous, posterior coxæ beneath nude and closely punctured, opaque; abdomen elongate fusiform, slightly shining at apex; first segment not broadly dilated at tip, longitudinally rugose and in profile subpyramidal; second and third segments strongly confluently punctured, base and middle of second longitudinally rugose, gastrocœli large and very deep; apical segments almost smooth. Length .55 inch.

♂.—Face, clypeus, labrum, spot on mandibles, palpi, scape beneath, tegulæ, short line before and one beneath, spot on four anterior coxæ beneath, anterior femora in front, four anterior knees, their tibiæ and tarsi, basal half of posterior tibiæ and base of their tarsi yellowish; otherwise marked as in ♀.

Hab.—Can., White Mts., N. H. Specimens may be found with the two pale spots on second abdominal segment confluent and forming a band.

71. **uncinatus**, n. sp.

♀.—Robust, dull black; broad annulus on antennæ, scutellum, anterior knees in front, their tibiæ, intermediate tibiæ except tips, broad annulus on posterior pair, a dot on each side of apex of first abdominal segment, a band on apex of second and a spot on middle of three apical segments, all white; antennæ short, robust, strongly involute, joints short, the third not twice longer than broad and subequal with the fourth; scutellum broad, very slightly convex, smooth, polished, and impunctured, apex truncate; metathorax obliquely truncate behind, slightly excavated, lateral carina prominent and sharp, central area large, quadrate; wings uniformly fuliginous; legs tolerably stout, apex of posterior coxæ beneath with a brown pubescent patch; abdomen oblong-ovate, closely and deeply punctured on segments two and three, apical segments shining; first segment rather broadly dilated at tip, shining and finely aciculate, in profile subpyramidal, gastrocoeli moderately large and deep. Length .55 inch.

Hab.—Canada, (Pettit). A very distinct species, allied to *feralis* but larger and more robust.

72. **feralis**, Cress. Trans. Am. Ent. Soc. i, p. 301, ♀.

Hab.—Can., N. H., Mass. A rather small robust black species with annulus on antennæ, scutellum, band on tibiæ, band on apex of second abdominal segment and two spots on tip of abdomen white or yellowish, wings subhyaline. One specimen from Canada has a narrow pale band at apex of third abdominal segment. Length ♀ .40—.45 inch.

73. **bizonatus**, Cress. Proc. Ent. Soc. Phil. iii, p. 160, ♀.

Hab.—Colorado. A dull black species, with sides of face, annulus on antennæ, scutellum, most of tibiæ and a band uneven posteriorly, at base of second and third abdominal segments, yellowish-white; wings fusco-hyaline; the antennæ are long and slender. Length ♀ .50 inch.

74. **texanus**, n. sp.

♂.—Small, black, shining; face, clypeus, spot on mandibles, palpi, orbits, interrupted behind summit of eyes, scape beneath, tegulæ, line in front, short line beneath, scutellums, two spots on posterior face of metathorax, four anterior coxæ, all the trochanters, four anterior femora in front, their tibiæ and tarsi, basal two-thirds of posterior tibiæ, their tarsi except tips of joints, apical margin of three basal segments of abdomen and spot on apical segment, yellowish-white; the band on apex of first segment is broad and even, that on second rather broad and strongly sinuate anteriorly, that on third very narrow and subinterrupted medially and dilated laterally; flagellum slender, entirely black; scutellum convex; wings clear; abdomen finely punctured, postpetiole punctured, gastrocoeli rather deep. Length .37 inch.

Hab.—Texas, (Belfrage). A pretty little species.

75. **suadus**, n. sp.

♂.—Small, slender, black; orbits, face, clypeus, mandibles, palpi, scape beneath, annulus on flagellum, line on collar, tegulæ, line before, short one beneath, scutellums, spot behind posterior wings, a zigzag mark on posterior face of metathorax, four anterior coxæ, all the trochanters, four anterior legs in front, basal half of posterior tibiæ, their tarsi, and apical margin of first and second abdominal segments, extending up on sides of second segment, all yellowish-white; antennæ nearly as long as the body, slender; abdomen delicately punctured, postpetiole narrow, nearly smooth, gastrocœli subobsolete, indicated by a pale spot; apex of abdomen piceous. Length .40 inch.

Hab.—Canada. This species has remarkably long antennæ.

76. **calitergus**, Cress. Trans. Am. Ent. Soc. i, p. 299, ♀.

Hab.—Maine. A robust dull black species, with stout antennæ and fusco-hyaline wings; annulus on flagellum, scutellum, band on tibiæ, band on three basal segments of abdomen and two spots on apical segments yellowish-white; coxal scopa distinct. Length ♀ .50 inch.

77. **consignatus**, Cress. Trans. Am. Ent. Soc. i, p. 298, ♂.

Hab.—Mass., W. Va. A dull black species, easily recognized by the white markings of the abdomen which are as follows: a longitudinal spot on each side of second and third segments and apical margins of fourth and following segments except the last, broad on the seventh; the apical margin of the third segment is sometimes narrowly white; wings clear, dusky at tips. Length ♂ .57 inch.

78. **albomarginatus**, Cress. Trans. Am. Ent. Soc. i, p. 297, ♂.

Hab.—Mississippi. A black species with clear wings, and apical margin of all the segments more or less, white; the band on postpetiole is broad, that on second segment narrow but entire, on the three following segments the bands are still narrower and abbreviated laterally, while on the two apical segments they are dilated into spots; face, clypeus, mouth, orbits, scape beneath, upper and anterior margins of prothorax, tegulæ, line beneath, stripe on pleura anteriorly, spot on disc of mesothorax, scutellums, two spots on metathorax, four anterior legs in front and band at base of posterior tibiæ, all whitish. Length ♂ .50 inch.

79. **Blandii**, Cress. Proc. Ent. Soc. Phil. iii, p. 188, ♂.

Hab.—Pennsylvania. This pretty species is black, with the pleura, metathorax and legs fulvous; the antennæ are nearly as long as the body, with a broad white annulus; the face, orbits, two short lines on disc of mesothorax, a sutural line on each side, the tegulæ and a line beneath, anterior margin of the collar, a spot on each side of the meso-

thorax behind the tegulæ, lateral and apical margins of the scutellum, postscutellum, a large mark on each side of pleura, four anterior coxæ and trochanters, the tarsi, the apical margins of the abdominal segments, and the apical segment entirely, all white; posterior tibiæ and base of tarsi blackish; the wings are clear; the base of the metathorax above is blackish. Length ♂ .42 inch.

80. **Dakota,** Cress. Trans. Am. Ent. Soc. i, p. 302, ♂.

Hab.—Dakota Territory. A dull black species with clear wings and a single yellow band on abdomen, (third segment), shading into pale ferruginous posteriorly; the face, scutellums, posterior face of metathorax and most of legs are yellow; antennæ black above, pale beneath. Length ♂ .50 inch.

81. **pictifrons,** Cress. Proc. Ent. Soc. Phil. iii, p. 160, ♂.

Hab.—Colorado. A small slender species, with the second and third abdominal segments entirely yellowish-ferruginous; the face is whitish marked with black, and the scutellum and most of tibiæ yellowish; wings subhyaline. Length ♂ .42 inch.

82. **bipunctatus,** Cress. Proc. Ent. Soc Phil. iv, p. 253, ♂.

var. *festus,* Cress. id. p. 257, ♂.

Hab.—Colorado. In the type the head is entirely black with two yellow spots on clypeus; the thorax entirely black except a yellow dot on tegulæ, another beneath and one on tip of scutellum; legs yellow, coxæ and trochanters black, and femora and tips of posterior tibiæ fulvous; second and third segments of abdomen yellowish-ferruginous, the former pale at base and the latter with a large fuscous stain at base. The variety *festus* differs by the clypeus being yellow except a black spot at tip, and the second and third abdominal segments being dull ferruginous, stained with fuscous; wings subhyaline. Length ♂ .55 inch.

83. **Wilsoni.**

Ischnus Wilsoni, Cress. Proc. Ent. Soc. Phil. iii, p. 188, ♂.

Hab.—N. J., Del., Va. A small, elongate, slender, shining black species; the abdomen convex and cylindrical with the second and third segments entirely yellow except narrow black apical margin; the antennæ are black above, pale beneath; face, scutellum and most of legs yellow; wings yellowish-hyaline. Length ♂ .40—.50 inch.

84. **versabilis,** n. sp.

♂.—Dull black; line on anterior orbits, face, clypeus, mandibles, labrum, palpi, scape beneath, anterior margin of tegulæ, line before, another beneath, scutellum, sometimes a spot or line behind, dot on four anterior coxæ and

trochanters beneath, their knees, tibiæ and tarsi, anterior femora in front, posterior tibiæ and tarsi except tips, sometimes two dots or a line at tip of first abdominal segment, and the second and third more or less, all bright yellow; occasionally the base of second and third segments is margined with dull ferruginous, and the apical middle more or less varied with black, sometimes interrupting the yellow on third segment into two spots and in one specimen these are reduced to mere dots and the yellow on second segment interrupted medially by a black line; wings subhyaline; postpetiole aciculated; gastrocœli large and deep; antennæ more or less pale beneath; posterior femora sometimes pale at base. Length .45—.55 inch.

Hab.—Can., Me., N. Y., Va. This is quite a variable species, closely allied to *comes* which however has a more finely sculptured abdomen.

85. **comes**, Cress. Proc. Ent. Soc. Phil. iii, p. 158, ♂; Trans. Am. Ent. Soc. i, p. 301.

Hab.—Can., Me., N. H., Mass., N. Y., Pa., Va., Ill. This is an extremely variable species but easily recognized by the yellow second and third abdominal segments, which are more or less black *at apex;* in some specimens the third segment is entirely yellow, and the black band on second segment very broad; the postpetiole is always black, rarely with a yellow dot on each side at tip; in the variety *aleatorius* the fourth segment has an interrupted yellow band at base. The metathorax varies from almost entirely yellow to entirely black; the scutellum is always yellow and the legs quite constant in coloration; the mesothorax has sometimes a spot or two short yellow lines on the disc and in one specimen two entire stripes. Some specimens have fuscous wings, these will probably prove to be varieties of *Bronteus*, and a large series of specimens is required to decide whether or not they are both one and the same species. Length ♂ .50—.65 inch.

86. **trizonatus**, Prov. Nat. Can. ix, p. 8, ♂.

Hab.—Canada. This species has a broad yellow band at apex of the three basal segments of the abdomen. It closely resembles *comes*, but the postpetiole is broader, the gastrocœli are larger and deeper, and the colors on second and third segments are reversed, *i. e.*, black at base and yellow at apex. Length ♂ .55 inch.

87. **munificus**, Cress.

nobilis, Cress. (nec *Wesm.*), Proc. Ent. Soc. Phil. iii, p. 155, ♂.

Hab.—N. Y., Ill. This fine species has the appearance of a large fat specimen of *lætus* which it resembles in color and markings. Length ♂ .65—.75 inch.

88. **lætus,** Brullé, Hym. p. 303; Cress. Trans. Am. Ent. Soc. i, p. 300.
paratus, Say, Bost. Jour. Nat. Hist. i, p. 228, ♂.

Hab.—Can., N. H., Mass., N. Y., N. J., Pa., Del., Md., Va. This is our commonest species. The second, third and fourth segments of abdomen are yellow, more or less broadly banded *at base* with black; the postpetiole is always yellow at tip; occasionally the yellow on fourth segment is interrupted so as to form two spots sometimes reduced to dots, or entirely wanting; the mesothorax has often two short lines or a spot on the disc, and the metathorax varies from almost entirely yellow to entirely black. Length ♂ .60—.65 inch.

89. **mimicus,** Cress. Trans. Am. Ent. Soc. i, p. 300, ♂.

Hab.—Can., Mass., N. Y., Ct. This is smaller than *lætus*, with the abdomen more convex, the postpetiole broader and nearly smooth and the apical segments more or less distinctly fulvous at tip; otherwise it is colored much the same. Length ♂ .45 inch.

90. **zebratus,** Cress. Trans. Am. Ent. Soc. i, p. 299, ♀; iv, p. 156, ♂.

Hab.—Ill., Ga., Tex. This pretty little species has a broad yellow band at apex of all the abdominal segments; face, orbits, line before, wings, spot on disc of mesothorax, scutellums, large mark on sides of pleura, posterior half of metathorax except median black spot behind and most of coxæ, also yellow; legs fulvo-ferruginous; wings tinged with yellowish; the flagellum of antennæ ♀ has a white annulus, that of ♂ is entirely black; coxal scopa ♀ distinct. Length ♂ ♀ .35—.40 inch.

91. **parvus,** Cress. Proc. Ent. Soc. Phil. iii, p. 159, ♂.

Hab.—Mass., N. Y., Va., Ill. This little species is about one-half the size of *lætus*, and is colored almost exactly like that species and seems to be subject to the same variation in color. The mesothorax has sometimes two short lines or a spot on its disc; the metathorax is often more or less varied with yellow and the fourth abdominal segment is sometimes entirely black; the gastrocoeli are deep and well marked. Length ♂ .30—.40 inch.

92. **vescus,** Prov. Nat. Can. ix, p. 9, ♂.

Hab.—Can., N. H., N. Y. This is the same size as *parvus* and resembles that species very much in color, but is at once distinguished by the subobsolete gastrocoeli. It much resembles some well marked specimens of *paratus*, Say. Length ♂ .30—.40 inch.

93. **pomilius**, Prov. Nat. Can. ix, p. 9, ♂.

Hab.—Can., Mass., B. Col. A long, narrow black species with the second, third and fourth segments of abdomen yellow, more or less tinged with fulvous, a broad black band at apex of second and narrow apical margins of third and fourth segments, black; antennæ blackish above, pale beneath; face, tegulæ, scutellum, four anterior coxæ and all the trochanters, yellow; four anterior legs except femora behind, base of posterior tibiæ and of their tibiæ fulvous-yellow; wings clear; a variety from Mass. has the middle of third and fourth segments varied with black. Length ♂ .35—.40 inch.

94. **flavizonatus**, Cress. Proc. Ent. Soc. Phil. iii, p. 156.

multor, Cress. Trans. Am. Ent. Soc. i, p. 299, ♂.

Hab.—Can., N. Y., Del., Va. This is a dull black species, with the face, tegulæ, line before and another beneath, scutellum, two spots on metathorax, legs and apical margins of all the abdominal segments, yellow or yellowish-white; tips of posterior femora and of their tibiæ black; the two spots on metathorax are sometimes mere dots, while in some specimens they are large and confluent; the bands on second and third segments of abdomen are often broad and more or less narrowed in the middle anteriorly, sometimes the fifth segment is immaculate, or with a very narrow interrupted band; occasionally the coxæ are marked with black and the femora all more or less fulvous; antennæ generally blackish above, fulvous beneath; the pale bands on abdomen vary from almost white to fulvous-yellow. One specimen from Virginia, has the markings of the abdomen reduced to a dot on each side of postpetiole, a narrow band at tip of second, third, sixth and seventh segments. A specimen from Canada has the band on second segment reduced to a dot on lateral margins. Length ♂ .55—.63 inch.

This may be the ♂ of *jucundus*.

95. **dictiosus**, n. sp.

♂.—Opaque bright lemon-yellow; middle of vertex and occiput dull ferruginous; antennæ fulvous, scape yellow; middle of prothorax and lateral sutures of mesothorax black, also scutellar region and broad upper and narrow lateral margins of pleura; mesothorax ferruginous with two narrow longitudinal yellow stripes which become confluent on posterior disc where it forms a large spot; pleura dull ferruginous beneath; metathorax tinged with fulvous, its basal suture and spot in central area black; wings hyaline; legs slender; posterior coxæ with a black spot beneath and a ferruginous stain on the outer side at base; four anterior femora more or less fulvous at base above, posterior pair ferruginous, more or less black at tips; posterior tibiæ black at tips, their tarsi dusky; abdomen narrow, very densely sculptured; first segment ferruginous, black at tips, apex of second segment with a broad black band, that of third

with a narrower one, the three following segments broadly black at base, apical segment fulvous; yellow at tip; gastrocoeli small and deep; postpetiole finely aciculated. Length .50 inch.

Hab.—Kansas.

96. **comptus,** Say, Bost. Jour. Nat. Hist. i, p. 229, ♂.

Hab.—Pa., Del., Md., Tex. A slender, gracefully formed species, the abdomen being strongly narrowed to base. The prevailing color is yellow with the vertex, occiput and antennæ except scape beneath, black; mesothorax black, with two central yellow lines, a yellow dot on each side behind the tegulæ; prothorax black, broadly margined with yellow, pleura black, with a large yellow blotch on each side; tegulæ, scutellums and metathorax, yellow, the latter with a broad central black stripe, sometimes interrupted at base; wings pale-yellowish hyaline; legs yellow, posterior coxæ black beneath, their femora and tips of their tibiæ tinged with ferruginous, sometimes the posterior femora are blackish; abdomen very slender at base, gradually widening towards the apex; basal two-thirds of the first segment above, the basal one-half or one-third of the second, third and fourth segments, and the remaining segments except their apical margins, black; sometimes the basal black band on the third segment is quite narrow, while all the others are broad. Length ♂ .50—.55 inch.

This may be the ♂ of *atrifrons*.

97. **atrifrons,** Cress. Proc. Ent. Soc. Phil. iii, p. 157, ♀; Trans. Am. Ent. Soc. i, p. 298.

Hab.—Pa., Ill. This species has much the same graceful form as *comptus*, of which it may be the ♀, the abdomen being narrowed and very slender at base; the face is entirely black, the antennæ slender, with a white annulus on flagellum; anterior orbits, two slender stripes on mesothorax, scutellum, two large spots on metathorax, coxæ, and band at tip of all the abdominal segments, yellow; legs fulvo-ferruginous; wings yellowish-hyaline. Length ♀ .50 inch.

98. **inconstans,** Cress. Proc. Ent. Soc. Phil. iii, p. 153, ♂.

Hab.—Colorado. An elongate rather narrow black species with the face, clypeus, scutellum, most of legs, and the second, third and fourth abdominal segments, yellow; the second and third segments more or less varied with fulvous at tip, and the yellow on fourth segment contracted and interrupted medially; the two apical segments are fulvous; wings yellowish-hyaline; posterior coxæ, their femora, and tips of their tibiæ black. Length ♂ .55 inch.

99. **infucatus**, Cress. Proc. Ent. Soc. Phil. iv, p. 252, ♂.

Hab.—Col., Cal., Vancouver's Island. This is a black species, with the face, clypeus, scape beneath, tegulæ, spot before and beneath, scutellum, legs (except coxæ, posterior femora and tips of their tibiæ) tips of first abdominal segment and the three following segments more or less, yellow; one specimen has two yellow spots on metathorax posteriorly; the basal margin of fourth abdominal segment is generally more or less black, occasionally also the base of third and rarely that of second; one specimen has the second and third segments and sides of the face of a beautiful rosy-fulvous color, another specimen has the second, third and fourth segments entirely yellow; apex of abdomen always fulvous; wings smoky-hyaline. Length ♂ .45—.55 inch.

This and *inconstans* may prove to be varieties of the same species.

100. **salvus**, Cress. Proc. Cal. Acad. Nat. Sci. 1877.

Hab.—Vancouver's Island. This rather large species is black with the face, clypeus, scape beneath, tegulæ, line in front, scutellum, spot behind, four anterior coxæ and legs, posterior tibiæ and tarsi and second and third abdominal segments yellow; posterior coxæ and femora and third abdominal segment fulvous; posterior margin of second, third and fourth segments narrowly blackish; apex of postpetiole fulvous, yellow laterally; mesothorax has two indistinct dull ferruginous longitudinal lines; wings yellow-hyaline. Length ♂ .65 inch.

101. **subdolus**, Cress. Trans. Am. Ent. Soc. i, p. 298, ♀.

Hab.—Can., Me., Mass. A very robust species, with short, stout antennæ, the joints of which are short and thick. The vertex, mesothorax, metathorax except flanks, tibiæ, tarsi, postpetiole and apex of abdomen are ferruginous; annulus on flagellum, scutellum and band at apex of second and third segments of abdomen are yellowish, sometimes the postpetiole has a yellow dot on each side; wings fusco-hyaline, with a golden gloss. Length ♀ .55 inch.

102. **jucundus**, Brullé, Hym. p. 305.

Hab.—Can., Me., N. Y., Pa. This handsome species is shaped like *subdolus*, and is easily recognized by the fulvous second abdominal segment, while the third, fourth and sixth are black with a yellow band at tip; the antennæ are short, thick and tricolored—fulvous-yellow and black, and the legs are fulvous; wings fusco-hyaline. Length ♀ .45—.55 inch.

This may be the ♀ of *flavizonatus*.

103. **zelotypus,** Cress. Trans. Am. Ent. Soc. i, p. 299, ♂.

Hab.—West Virginia. A rather large dull black species with a yellow band on tips of the three basal segments of abdomen, the remaining segments are ferruginous, with a blackish band at base of the fourth, very narrow in one specimen; wings yellow-hyaline. Length ♂ .55—.70 inch.

104. **creperus,** Cress. Trans. Am. Ent. Soc. i, p. 298, ♂.

Hab.—Can., W. Va. This pretty species has the abdomen fulvous with a narrow black band at base of the segments, the postpetiole is always yellow; in all the specimens the metathorax is yellow above, and the posterior coxæ, femora except extreme base and tips of their tibiæ are black; one specimen has the abdomen yellow-fulvous. Length ♂ .55—.60 inch.

A specimen from Virginia, and probably a variety of this species, has a narrow dull yellow annulus on flagellum, the posterior femora fulvous, and the tips of second and third abdominal segments yellow; the postpetiole fulvous and yellow, and the cheeks are broadly yellow. Length ♂ .62 inch.

105. **variegatus,** Cress. Proc. Ent. Soc. Phil. iii, p. 153; iv, p. 251, ♂.

Hab.—Col., N. Mex., Cal., Van. A rather slender and extremely variable species, black, with the face, scutellum, metathorax more or less and most of the legs yellow; wings clear; abdomen varied with yellow, ferruginous and black, scarcely any two specimens being colored alike. Length ♂ .45—.60 inch.

For remarks on the variation of this species see Proc. Ent. Soc. Phil. iv, p. 251.

106. **Grotei,** Cress. Proc. Ent. Soc. Phil. iii, p. 154, ♂.

Hab.—Col., Ill. A long, rather narrow species, with the abdomen of three colors—black, fulvous and yellow, the base being black, the middle fulvous, shading into yellow to the tip of the segment; the apical segments lose the bright yellow color and are fulvous and black; the thorax is more or less varied with fulvous both above and beneath; the face and scutellum yellow, and the metathorax almost entirely yellowish-fulvous; the wings are yellowish hyaline and the legs fulvous and yellow. Three specimens from Illinois are of a duller color than those from Colorado. Length ♂ .55—.60 inch.

107. **delicatus,** Cress. Proc. Ent. Soc. Phil. iv, p. 253, ♂.

Hab.—Colorado. A delicate looking species both in shape and color. It is lemon-yellow, with the vertex, occiput, antennæ, spot

on each side of pectus, mesothorax, except two dorsal lines, sides of scutellum, broad sutures of pleura, and the basal middle of abdominal segments four to six, black; the femora and delicate stains on the abdomen fulvous; wings yellowish hyaline, with the nervures pale fulvous. Length ♂ .50 inch.

This may be a very pale variety of *Grotei*.

108. **paratus**, Say, Contrib. Macl. Lyc. i, p. 68, ♂; Cress. (*Ischnus*), Proc. Ent. Soc. Phil. iii, p. 156, ♂.

Hab.—Can., N. Y., Pa., Del., Va. A pretty little species, slender in form and exceedingly variable in its markings. The head is yellowish-white; with the vertex and occiput black; antennæ long, slender, black above, fulvous beneath, with a more or less broad whitish annulus beyond the middle and with the basal joint beneath yellow; thorax black, shining, with the upper and lower margins of prothorax, a spot on disc of mesothorax, sometimes wanting, tegulæ and a line beneath, scutellum, postscutellum, posterior portion of metathorax and a large spot on the thorax beneath between the four anterior legs and extending more or less upon the sides, all yellowish-white; wings clear; four anterior legs, including their coxæ, yellowish-white, posterior coxæ varied with yellowish beneath, their trochanters, base of femora, basal two-thirds of their tibiæ and the apical joints of their tarsi, yellowish-white; abdomen yellowish-white, apical half more or less fulvous, first segment smooth and polished, slender, black above before apex, remaining segments with a black, often irregular, stain on the middle, sometimes forming a regular band, sometimes two spots; these stains become less distinct on the apical segments, which are sometimes entirely fulvous; beneath yellowish, fulvous at tip. Length ♂ .30—.40 inch.

109. **vinnulus.**

Ischnus vinnulus, Cress. Proc. Ent. Soc. Phil. iii, p. 189, ♂.

Hab.—Pa., Va. This may possibly be nothing but a variety of *paratus;* the markings are very similar, but the posterior femora are fulvous and not black, the first segment of the abdomen is black except its tip, and the basal two-thirds of the second and third segments are also black. Length ♂ .40—.45 inch.

110. **Heiligbrodtii**, n. sp.

♂.—Small, black; face, clypeus, orbits, spot on mandibles, scape beneath, annulus on flagellum, line on collar, upper margin of prothorax, spot on tegulæ, short line above, another beneath, two slender lines on disc of mesothorax, scutellum, spot behind, posterior face of metathorax, spot on flanks, spot above middle coxæ, tips of four anterior coxæ, spot on posterior pair above, apical

margin of abdominal segments one to four, that on second deeply emarginate on anterior middle and that on fourth very narrow and interrupted, line on apex of sixth and the seventh entirely, all white; posterior margin of cheeks, sides of prothorax, pleura, sides of metathorax, legs and abdomen, except base of second and third segments, ferruginous; wings hyaline; postpetiole punctured; gastrocoeli rather deep. Length .35 inch.

Hab.—Bastrop, Texas, (L. Heiligbrodt). Allied to *honestus*.

111. **honestus**, Cress. Trans. Am. Ent. Soc. i, p. 310, ♂.

Hab.—W. Va., Ga. A very pretty species easily recognized by the fulvous abdomen, with the first four segments margined at tip with yellowish, and the apical segment entirely yellowish; legs fulvous; head and abdomen black and white; antennæ black above, pale beneath, with broad whitish annulus above; wings hyaline. Length ♂ .42 inch.

112. **milvus**, Cress. Trans. Am. Ent. Soc. i, p. 305, ♂.

Clopini, Prov. Nat. Can. vii, p. 250, ♂.

Hab.—Can., N. H., Mass. A long, narrow black species with honey-yellow antennæ, scutellum, legs and abdomen, except last three segments which are black; the face and coxæ are pale-yellow and the wings yellowish-hyaline. Length ♂ .65 inch.

113. **volesus**, Cress. Trans. Am. Ent. Soc. i, p. 304, ♀.

Hab.—Massachusetts. A robust black species, with the second and third segments of abdomen entirely ferruginous, and the two apical segments each with a white spot; coxal scopa distinct. Length ♀ .45 inch.

114. **involutus**, Cress. Proc. Ent. Soc. Phil. iii, p. 183, ♀.

Hab.—Colorado. A small shining black species, with the mandibles, scape beneath, legs, scutellum obscurely, and second and third abdominal segments ferruginous; antennæ short and strongly involute; postpetiole punctured on disc; gastrocoeli obsolete; wings subhyaline. Length ♀ .35 inch.

115. **restrictus**, n. sp.

♂.—Black, rather slender, subopaque; face, clypeus, mandibles, palpi, scape beneath, tegulæ, short line before, another beneath, scutellum, spot on four anterior coxæ beneath, four anterior legs, posterior tibiæ except tips, and their tarsi, yellow; four anterior femora fulvous behind, posterior femora sometimes fulvous within; wings subhyaline; second and third segments of abdomen ferruginous, densely punctured; postpetiole narrow, aciculated; gastrocoeli small and deep. Length .60 inch.

Hab.—New York. This may prove to be an extreme variety of *instabilis*.

116. **Belfragei**, Cress. Trans. Am. Ent. Soc. iv, p. 156, ♂.

Hab.—Texas, (coll. Belfrage). Black; sides of face and of clypeus, dot on tegulæ anteriorly, short line beneath and scutellum, white; wings uniformly pale fuliginous; anterior tibiæ pale in front; abdomen shining, second, third and base of fourth segments yellowish-ferruginous. Length .50 inch.

117. **procax**, n. sp.

♂.—Rather large, opaque deep black, roughly sculptured; face except middle, clypeus, spot on mandibles, spot on scape beneath, tegulæ, spot in front, another beneath, scutellum, dot on outer side of four anterior coxæ, spot on their trochanters, their knees, and tibiæ and tarsi entirely, posterior tibiæ except tips and their tarsi except extreme tips of joints, white or yellowish-white; scutellum gibbous, subangular in profile, the basal excavation very deep; mesothorax coarsely not closely punctured; metathorax roughly sculptured, with coarse elevated lines; wings subhyaline, tinged with yellowish; legs slender; abdomen long, rather narrow, coarsely and longitudinally rugose, second, third and fourth segments dull ferruginous, yellowish beneath, gastrocœli large and deep. Length .65 inch.

Hab.—Canada.

118. **leviculus**, n. sp.

♂.—Black; abdomen except the first and last one or two segments, ferruginous; sides of face and clypeus broadly, spot on mandibles, palpi, orbits, spot on scape beneath, broad annulus on antennæ, upper margins of prothorax, dot on tegulæ, line beneath, scutellum, dot behind, two spots or dots on metathorax behind, four anterior coxæ beneath, spot at tips of posterior pair and narrow posterior margin of postpetiole, white; wings hyaline, slightly dusky at tips; four anterior legs except femora behind pale, base of posterior tibiæ more or less ferruginous; abdomen narrow, finely punctured, postpetiole punctured, gastrocœli deep. Length .40 inch.

Hab.—N. Y., Va. Resembles some of the dark varieties of ***duplicatus.***

119. **terminalis**, Cress. Proc. Ent. Soc. Phil. iii, p. 184, ♀.

Hab.—Delaware. A small robust ferruginous species, with head, pro- and mesothorax, most of pleura, tips of posterior femora and of their tibiæ and apex of abdomen, black; annulus on antennæ, scutellum and two spots on apex of abdomen yellowish-white. Length ♀ .30 inch.

This is probably the ♀ of *finitimus*.

120. **finitimus**, Cress. Trans. Am. Ent. Soc. i, p. 304, ♂, (not ♀).

var. *Mesostenus apicalis*, Prov. Nat. Can. vii, p. 266, ♂.

Hab.—Can., N. H., N. Y., Pa., Ill. A small, long, slender species, with black antennæ, head, thorax and tip of abdomen; legs and three or four basal segments of abdomen, and occasionally the metathorax

ferruginous; annulus on flagellum, anterior orbits, clypeus, scutellum, four anterior coxæ and spot at tip of abdomen, white. Length ♂ .30—.37 inch.

This may be the ♂ of *terminalis*.

121. **hospitus**, Cress. Trans. Am. Ent. Soc. i, p. 306, ♂ ♀.

Hab.—Can., Ill. A small black species with legs and three basal segments of abdomen ferruginous, the latter finely punctured and shining; annulus on antennæ, scutellum and face of ♂ yellowish; antennæ ♀ thickened towards tips, base ferruginous, middle whitish, apex black, third joint about twice longer than broad and longer than fourth; antennæ ♂ long, black above, fulvous beneath; tips of posterior femora, and of their tibiæ more or less black; wings subhyaline. Length ♂ ♀ .30 inch.

122. **cervulus**, Prov. Nat. Can. vii, p. 83, ♂.

Hab.—Canada. A small black species with second and third abdominal segments pale ferruginous, and the tibiæ and tarsi more or less yellowish; wings subhyaline; head and antennæ entirely black, the latter short and sometimes pale at tips beneath. Length ♂ .30—.35 inch.

123. **decoratus**, Prov. Nat. Can. vii, p. 83, ♂.

Hab.—Can., Mass. Same size and general appearance of *cervulus*, but has ferruginous legs, and the sides of face and clypeus are white. Length ♂ .30 inch.

124. **lachrymans**, Prov. Nat. Can. vii, p. 78, ♂.

Hab.—Can., N. H. Closely resembles *cervulus* but has the face, clypeus and scutellum yellow; same size.

125. **citrifrons**, Cress. Trans. Am. Ent. Soc. i, p. 307, ♂.

Hab.—Ct., Pa. A small black species, with face, scutellum, and the four anterior coxæ and trochanters pale yellow; the legs including posterior coxæ and second and third abdominal segments yellow ferruginous; apical half of posterior femora and tips of their tibiæ black; antennæ long and fulvous, darker above; wings clear. Length ♂ .26 inch.

126. **limbifrons**, Cress. Proc. Ent. Soc. Phil. iii, p. 182, ♂.

Hab.—Colorado. A small slender black species, with the legs except base, and abdomen except apex, ferruginous; lateral margins of face and dot on each side of clypeus, white; wings clear; postpetiole narrow, punctured, gastrocoeli small, deep, punctiform. Length ♂ .30 inch.

127. **vecors** (*ventralis*, Cress. Trans. Am. Ent. Soc. i, p. 308, ♀.)

Hab.—Hudson's Bay Territory. A small robust black species, with anterior orbits, mouth, scutellum and three basal segments of abdomen, ferruginous; antennæ yellowish ferruginous, black at base and apex, the joints very short and thick-set; legs varied with black and yellowish; wings clear; abdomen convex, base of first and third and lateral basal margin of second segment black. Length ♀ .33 inch.

128. **nigrovariegatus.**

Phygadeuon nigrovariegatus, Prov., Nat. Can. vii, p. 182.

♀.—Small, robust, ferruginous; face, cheeks, thorax especially laterally, and apex of abdomen, varied with black; antennæ short, ferruginous, with short, submoniliform joints, three to five subquadrate, subequal, middle joints paler, apical ones black; scutellum flat; metathorax with indistinct elevated lines; wings tinged with dusky, the areolet broad five-angular; legs short, robust, especially the femora which are swollen, coxæ, four anterior femora behind, posterior pair entirely and tips of their tibiæ, black; abdomen shining, sparsely punctured, postpetiole broad, smooth; gastrocœli small, shallow. Length .25 inch.

Hab.—Canada, (coll. Provancher).

129. **humilis**, Prov. Nat. Can. vii, p. 82, ♀.

var. *Phygadeuon dorsalis*, Prov. Nat. Can. vi, p. 285, ♀.

Hab.—Canada, (coll. Provancher). This is probably nothing more than a variety of *nigrovariegatus* with less black markings.

130. **tumidifrons**, Cress. Trans. Am. Ent. Soc. i, p. 311, ♀.

Hab.—Illinois. A very small ferruginous species with short protuberant face; head, apex of antennæ, metathorax, tips of posterior femora and tibiæ, and apex of abdomen black; annulus on flagellum, scutellum and spot on tip of abdomen white. Length ♀ .20 inch.

131. **seditiosus**, n. sp.

♀.—Subrobust, black; antennæ except apex and scape beneath, mandibles, mesothorax, scutellum, tegulæ, legs except coxæ and trochanters, and three basal segments of abdomen, ferruginous; wings fusco-hyaline; antennæ robust; legs slender; abdomen broadly fusiform, densely punctured, postpetiole broad, aciculated, gastrocœli large and deep, apical segments smooth and shining. Length .50 inch.

Hab.—Colorado, (B. H. Smith).

132. **indemnis**, Cress. Proc. Cal. Acad. Nat. Sci. 1877.

Hab.—British Columbia. A ferruginous species with the thoracic sutures, tips of posterior femora and of their tibiæ, apical margins of abdominal segments two to four, and the remaining segments entirely, black. Length ♂ .40 inch.

133. **caudatus**, Prov., Nat. Can. vii, p. 82 ♀.

Phygadeuon terminalis, Prov. Nat. Can. vi, p. 284, ♀.

Hab.—Can., Mass. A subrobust ferruginous species, with posterior femora, tips of their tibiæ, and fourth and following segments of abdomen black; scutellum and two spots on tip of abdomen whitish; antennæ long and slender. Length ♀ .43 inch.

134. **putus**, n. sp.

♀.—Small, pale ferruginous, finely punctured, rather shining; antennæ slender, apical third fuscous, third and fourth joints subequal in length, the third being little the longer; posterior femora except base, tips of their tibiæ and the fifth and following segments of abdomen black; wings hyaline; legs slender; abdomen depressed, second and third segments closely and uniformly punctured, postpetiole and apical segments smooth and shining, gastrocœli small and deep; apical margins of two apical segments whitish. Length .35 inch.

Hab.—Connecticut.

135. **grandis**, Brullé, Hym. p. 300.

regnatrix, Cress. Proc. Ent. Soc. Phil. iii, p. 178, ♀.

ambiguus, Cress. Proc. Ent. Soc. Phil. iii, p. 161, ♂.

Hab.—Can., Mass., N. Y., Pa., Del., Ga., Col., Van. This is our largest species; it is of a deep black color, with the abdomen except first segment ferruginous, and the wings dark fuliginous and violaceous. The scutellum has sometimes a white spot, and the postpetiole is occasionally ferruginous. The ♂ has the face, clypeus, spot on mandibles, scape beneath, short line before tegulæ, dot beneath, generally a spot on scutellum and the anterior legs in front, white. The ♀ has a white annulus on flagellum, and the coxal scopa is distinct. Length ♂ ♀ .70—1 inch.

136. **inurbanus**, Cress. Trans. Am. Ent. Soc. i, p. 302, ♀.

Hab.—W. Va., Col. A miniature of *grandis*, but more shining and less strongly sculptured; the postpetiole is finely aciculated; the gastrocœli rather small and the second segment evenly and not confluently punctured; the posterior coxæ are nude beneath. Length ♀ .55 inch.

137. **rufiventris**, Brullé, Hym. p. 301.

var. *incertus*, Cress. Proc. Ent. Soc. Phil. iii, p. 180, ♀.

semicoccineus, Cress. Proc. Ent. Soc. Phil. iii, p. 179, ♂.

var. *californicus*, Cress. Proc. Ent. Soc. Phil. iii, p. 180, ♂.

Hab.—Can., Mass., Pa., N. J., Del., Md., Va., Ill., Cal. Much smaller than *grandis*, the ♀ with slender antennæ, broadly fusiform abdomen and posterior coxæ nude beneath. A ♀ specimen from Ill.

has a pale spot on the scutellum, and a ♂ from Can. has the last two segments of abdomen black. The ♀ var. *incertus* has the legs, except coxæ and trochanters, ferruginous. The ♂ var. *californicus* has dark brown abdomen and ferruginous legs. Length ♂ ♀ .50—.70 inch.

This species has been found to be parasitic on *Vanessa Hunteri*.

138. **placidus**, Prov. Nat. Can. vii, p. 76, ♂.

Hab.—Canada, (coll. Provancher). Size and appearance of *rufiventris*, ♂. Black; abdomen dark ferruginous beyond first segment; face, clypeus, scape beneath, short line before tegulæ, dot beneath, spot on disc of scutellum, four anterior coxæ and trochanters beneath more or less, anterior tibiæ and femora before, and tips of middle femora before, white; wings violaceous-black; metathorax rugose, with sharply elevated lines, central area subreniform, large; postpetiole large, broad, coarsely rugose; gastrocoeli large and deep, black. Length .65 inch.

139. **devinctor**, Say, Am. Ent. pl. 22.

tibialis, Brullé, Hym. p. 300.

montivagus, Cress. Proc. Ent. Soc. Phil. iv, p. 255, ♂.

Hab.—Can., Pa., Del., Md., Ga., Ill., Col. A rather large species with red abdomen, pale scutellum, and white annulus on tibiæ and antennæ ♀. The ♂ closely resembles that of *grandis*, but separated at once by the scape being entirely black and by the white spot on posterior tibiæ near base. Length ♂ ♀ .55—.80 inch.

140. **lividulus**, Prov. Nat. Can. ix, p. 10, ♀.

Hab.—Canada. A robust species near *rufiventris*, but differs from that species by the conspicuous whitish scutellum, shorter and stouter antennæ, paler wings, and ferruginous tibiæ and tarsi. Length ♀ .65 inch.

141. **insolens**, Cress. Trans. Am. Ent. Soc. i, p. 302, ♂ ♀.

Joppa canadensis, Prov. Nat. Can. vi, p. 336, ♂.

Hab.—Can., N. C., Ga., Fla., La., Tex. A narrow, subcylindrical black species, with posterior femora and abdomen dark ferruginous, blackish wings and white annulus on antennæ. Length ♂ ♀ .55—.65 inch.

This may be the *Joppa maurator*, Brullé, Hym. p. 287.

142. **succinctus**, Brullé, Hym. p. 301.

Hab.—Can., N. Y., Pa., Md., Ill., La. This species is easily recognized by the ferruginous abdomen banded with black, pale scutellum, yellow tibiæ and tarsi and blackish wings; the black bands on abdomen vary much in width. Length ♂ .60—.65 inch.

143. **dorsalis**, Cress. Proc. Ent. Soc. Phil. iii, p. 177, ♀.

Hab.—Colorado. A robust black species with clypeus, mesothorax, scutellum and abdomen ferruginous; wings fuscous; postpetiole broad and aciculated; gastrocoeli moderately large and deep. Length ♀ .55 inch.

144. **Lewisii**, Cress. Proc. Ent. Soc. Phil. iii, p. 177, ♀; Trans. Am. Ent. Soc. i, p. 307.

var. *sandix*, Cress. Proc. Ent. Soc. Phil. iii, p. 174, ♀.

Hab.—N. Y., Va., Ga., Ill. A dark winged ferruginous species, with the pleura, metathorax, coxæ, and generally a band at base of third abdominal segment, black; the antennæ are slender and tri-colored—ferruginous at base, broadly yellow medially and black at tip; sometimes the thorax is entirely black except two stripes on mesothorax and scutellum; the var. *sandix* has the thorax above and abdomen entirely ferruginous. Length ♀ .55 inch.

145. **purpuripennis**, Cress. Proc. Cal. Acad. 1877.

Hab.—California. A rather stout ferruginous species with fusco-violaceous wings; antennæ short, stout, with apical half or two-thirds black; the basal margin of abdominal segments three and four are sometimes narrowly black. Length ♀ .50 inch.

146. **cupitus**, Cress. Proc. Cal. Acad. 1877.

Hab.—California. This is probably the ♂ of *purpuripennis*; color entirely ferruginous with antennæ except scape beneath, and sutures of thorax more or less, black; wings fuscous; face yellowish. Length ♂ .55 inch.

147. **compar**, Cress. Proc. Cal. Acad. 1877.

Hab.—Vancouver's Island. An elongate robust ferruginous species, with fuscous wings: antennæ stout ferruginous, paler medially and black at tips; closely allied to *purpuripennis*, but more elongate and differently shaped. Length ♀ .52 inch.

148. **crudosus**, Cress. Proc. Cal. Acad. 1877.

Hab.—California. An elongate ferruginous species, with blackish wings, black head and thorax beneath; face yellow; legs entirely ferruginous. Length ♂ .65 inch.

149. **trogiformis**, Cress. Proc. Ent. Soc. Phil. iii, p. 175, ♂; Trans. Am. Ent. Soc. i, p. 307, ♀.

Hab.—N. J., Ga., Fla., La., Tex. Easily recognized by the ferruginous body, broad blackish wings, unusually large head and strongly constricted abdominal segments; the metathorax, pleura and posterior

legs are sometimes more or less varied with black; the antennæ have a yellowish annulus in both sexes, sometimes indistinct; coxal scopa ♀ distinct. Length ♂ ♀ .40—.50 inch.

This may be the *Joppa ferrugator* (Fabr.) Brullé, Hym. p. 295.

150. **difficilis**, Cress. Proc. Cal. Acad. 1877.

Hab.—Van., Cal. A ferruginous species, with head, antennæ, thorax more or less, coxæ, tips of posterior tibiæ and basal margin of abdominal segments three to five, black; face yellow; wings dusky; mesothorax, scutellum and metathorax more or less ferruginous; first segment of abdomen entirely ferruginous. Length ♂ .60 inch.

151. **animosus**, Cress. Proc. Ent. Soc. Phil. iii, p. 164, ♂.

var. *rubellus*, Cress. Proc. Ent. Soc. Phil. iv, p. 254, ♂.

Hab.—Col., N. Mex. A slender black species, with face, clypeus, scape beneath, tegulæ, scutellum, four anterior legs, basal half of posterior tibiæ and their tarsi yellow; wings clear; abdomen ferruginous, with first segment entirely and base of remaining segments more or less black. The var. *rubellus* has paler abdomen and the metathorax is more or less yellow behind. Length ♂ .50 inch.

152. **discus**, Cress. Proc. Ent. Soc. Phil. iii, p. 168, ♂.

Hab.—Colorado. Closely allied to *animosus*, but the legs, except coxæ and trochanters, are entirely yellowish-ferruginous; the mesothorax is more or less dull ferruginous; the second and following abdominal segments are narrowly black at base. Length ♂ .50 inch.

153. **allapsus**, Cress. Proc. Ent. Soc. Phil. iv, p. 256, ♂.

Hab.—Colorado. A black species, with the abdomen entirely dull ferruginous, except the first segment which is black; wings clear; face, clypeus, scape beneath, tegulæ, scutellum, sometimes two spots on metathorax behind, four anterior legs, posterior tibiæ except tips, their tarsi and ventral fold, bright lemon-yellow. Length ♂ .55—.60 inch.

154. **vinulentus**, Cress. Proc. Ent. Soc. Phil. iii, p. 162, ♂.

Hab.—Colorado. Larger than *allapsus* which it closely resembles, but differs principally by the pale markings being white instead of lemon-yellow, and by all the coxæ being black. Length ♂ .65—.70 inch.

155. **nuncius**, Cress. Proc. Cal. Acad. 1877.

Hab.—California. Resembles *allapsus*, but the abdomen is paler in color; the posterior femora and tibiæ except tips and apex of postpetiole, are ferruginous; apex of metathorax, scutellum, face, and

four anterior coxæ and trochanters are lemon-yellow; wings clear. Length ♂ .55 inch.

156. **virginicus**, Cress. Proc. Ent. Soc. Phil. iii, p. 181, ♀.

Hab.—West Virginia. A medium sized, robust black species, with short ferruginous abdomen and clear wings; antennæ short, stout, with white annulus; legs robust, short, posterior tibiæ reddish at base; head and thorax immaculate. Length ♀ .50 inch.

157. **vultus**, Cress. Proc. Ent. Soc. Phil. iii, p. 165, ♂.

Hab.—Colorado. A small slender black species, with ferruginous abdomen and legs; face and apex of scutellum yellow; wings clear. Length ♂ .35 inch.

158. **Saundersii**, n. sp.

♂.—Black; anterior orbits broad on face, and sides of clypeus, white; antennæ black above with a narrow indistinct pale annulus, beneath fulvous black at extreme base and apex; thorax immaculate, shining; most of tegulæ, dot in front and short line beneath whitish; wings hyaline, iridescent; spot on four anterior coxæ beneath and their knees, tibiæ and tarsi more or less yellow, base of posterior tibiæ and of their tarsal joints dull ferruginous; abdomen ferruginous, finely punctured, first segment except postpetiole black, the latter punctured; gastrocoeli moderately large and deep. Length .35 inch.

Hab.—Canada. (Mr. William Saunders).

159. **canadensis**, Cress. Trans. Am. Ent. Soc. i, p. 308, ♀.

Hab.—Canada. A robust black species, with ferruginous abdomen, the third and fourth segments of which are black at base; the tibiæ are yellowish-white, black at tips, also scutellum and annulus on antennæ; wings subhyaline; antennæ with short stout joints. Length ♀ .43 inch.

160. **instabilis**, Cress. Trans. Am. Ent. Soc. i, p. 303, ♂ ♀.

Hab.—Can., Me., Mass., Ct., N. Y., N. J., Va., Ga., Col. A very variable species with the thorax, except scutellum, sometimes entirely black, sometimes with the mesothorax, and metathorax more or less ferruginous; the abdomen is often entirely ferruginous, sometimes more or less black at tip; the antennæ are slender, that of ♀ with a broad pale annulus. Length ♂ ♀ .50 inch. For notes on variation, see original description.

161. **fuscifrons**, Cress. Proc. Ent. Soc. Phil. iii, p. 166, ♀; Trans. Am. Ent. Soc. i, p. 307.

Hab.—N. Y., Ill. Form slender, ferruginous, head and thorax more or less black or fuscous; scutellum pale yellowish; antennæ slender, with pale annulus; wings clear; a spot at tip of abdomen,

sometimes a dot on each side of postpetiole and occasionally a spot on each side of third segment yellow; legs ferruginous. Length ♀ .50 inch.

162. **confirmatus**, n. sp.

♀.—Slender, fulvo-ferruginous; head, antennæ, pro- and mesothorax and lateral regions of scutellum, black; face, orbits, margins of prothorax, and scutellum, whitish; wings hyaline; antennæ slender, basal joints of flagellum elongate; legs slender; abdomen narrowly fusiform, gastrocoeli large, oblique. Length .37—.45 inch.

Hab.—Can., Mass., N. Y.

163. **velox**, Cress. Proc. Ent. Soc. Phil. iii, p. 185, ♀.

Phygadeuon apicatus, Prov. Nat. Can. vii, p. 180, ♀.

Phygadeuon Cressoni, Prov. Nat. Can. viii, p. 318, ♀.

Hab.—Can., Pa., N. J., Ill. A ferruginous species, with pleura and metathorax black; wings clear; apex of abdomen with yellowish spot, gastrocoeli very transverse, nearly meeting on the disc; antennæ black, with broad pale annulus; posterior femora more or less black. Length ♀ .30—.40 inch.

164. **ultimus**, n. sp.

♀.—Small, black, shining; face short; anterior orbits, spot on middle of face, clypeus and scape beneath dull ferruginous; antennæ with moderately short basal joints, a broad yellowish annulus on flagellum; mesothorax sparsely punctured; scutellum flat, yellow; wings subhyaline; legs robust, especially the femora, black, basal half of tibiæ yellow, tarsi ferruginous; abdomen except base of first segment ferruginous, a yellow spot on apical segment, postpetiole broad, smooth. Length .35—.40 inch.

Hab.—White Mts., N. H. (Morrison).

165. **vivax**, n. sp.

♀.—Small, rather robust, head and thorax, except scutellum, black immaculate; antennæ slender, black, with a broad yellowish annulus; scutellum pale yellow; wings subhyaline; legs subrobust, black, four anterior knees, tibiæ, posterior tibiæ except tips, and all the tarsi ferruginous; abdomen robust, ferruginous, first segment black, a whitish spot on two apical segments. Length .30 inch.

Hab.—White Mts., N. H. (Morrison).

166. **vafer**, n. sp.

♂.—Small, black; anterior orbits broader on face, spot on each side of clypeus, mandibles, narrow annulus on antennæ, spot on tegulæ, line before, short one beneath, scutellum and spot on anterior coxæ beneath, white; femora and abdomen except base of first segment, ferruginous; wings hyaline; antennæ about as long as the body, slender; base of first abdominal segment rugose, gastrocoeli large, deep. Length .30 inch.

Hab.—White Mts., N. H. (Morrison).

167. **lascivus**, Cress. Trans. Am. Ent. Soc. i, p. 309, ♂.

Hab.—Illinois. A very distinct and prettily marked species; black with head and thorax elaborately ornamented with white; legs and abdomen ferruginous, the latter with first and second segments black and a white spot on each apical corner of four basal segments; coxæ mostly white; antennæ long and slender with white annulus; mesothorax with two white stripes; wings clear, etc. Length ♂ .38 inch.

168. **funestus**, Cress. Proc. Ent. Soc. Phil. iii, p. 166, ♀.

hæsitans, Prov. Nat. Can. vii, p. 80, ♀.

Hab.—Can., N. H., Mass., Pa., Va., Ill. A robust, medium sized species, with head and thorax more or less black, abdomen ferruginous, scutellum yellowish, whitish annulus on antennæ, clear or subhyaline wings, black legs with tibiæ except tips and tarsi ferruginous; antennæ stout, with thick-set joints. One specimen from Ill. has a small yellow spot on each side of second abdominal segment. The head is sometimes entirely ferruginous, but generally, the occiput is black; the mesothorax is often varied with ferruginous. Length ♀ .37—.47 inch.

169. **maius**, Cress. Trans. Am. Ent. Soc. i, p. 307, ♀.

Hab.—Mass., N. C. Very near *funestus*, but with more slender antennæ and a whitish spot at tip of abdomen. Length ♀ .36 inch.

170. **W.-album**, Cress. Trans. Am. Ent. Soc. i, p. 309, ♂ ♀.

Ischnus W.-album, Cress. Proc. Ent. Soc. Phil. iii, p. 191, ♂.

Ischnus variegatus, Prov. Nat. Can. vii, p. 250, ♂.

Hab.—Can., N. H., Mass. The ♀ of this species is elongate, robust, black antennæ, head and thorax, and ferruginous legs and abdomen; spots on face and clypeus, orbits, annulus on antennæ, collar, upper margins of prothorax, sometimes a spot on disc of mesothorax, scutellum and a W-shaped mark on metathorax, sometimes reduced to two spots or entirely wanting, white; wings clear; postpetiole smooth, gastrocoeli subobsolete. Length .50—.55 inch.

The ♂ is long and slender with abdomen and legs fulvous; head except vertex and occiput, scape beneath, collar, upper margins of prothorax, spot on disc of mesothorax, scutellum, spot behind, tegulæ, line beneath, pleura more or less, a W-shaped mark on metathorax, coxæ and trochanters and tip and sides of first abdominal segment, all white or yellowish-white; antennæ long, black above with broad pale annulus, beneath more or less yellowish; first abdominal segment except tip and sides black, remaining segments more or less varied with

fuscous or black, sometimes entirely fulvous; the clypeus is concave and sides of the face depressed. Length .65—.70 inch.

171. **duplicatus**, Say, Bost. Jour. Nat. Hist. i, p. 230; Cress. Trans. Am. Ent. Soc. i, p. 309.

lobatus, Prov. Nat. Can. vii, p. 77, ♂.

Hab.—Can., N. H., Mass., N. Y., Ct., Pa., Del., Va., Ga. This seems very closely allied to *W-album* ♂, which is however larger, with broader head and has the *clypeus concave;* the abdomen of *duplicatus* is never varied with black or fuscous beyond first segment; the posterior legs are sometimes entirely black except base of tibiæ which is yellowish. Length ♂ .45—.53 inch.

This is probably the ♂ of *funestus*.

172. **annulatus.**

Mesostenus annulatus, Prov. Nat. Can. vii, p. 265, ♂.

Hab.—Can., Mass. A slender species with black head and thorax, and ferruginous legs and abdomen; face scutellum and annulus on posterior tibiæ pale yellowish; tips of posterior femora, remainder of their tibiæ and their tarsi black; antennæ black above with narrow pale annulus, beneath fulvous; wings subhyaline; abdomen sometimes fuscous at tip, second segment sparsely punctured and subdepressed at base, gastrocoeli obsolete, first segment black, ferruginous at tip. Length ♂ .45 inch.

This is closely allied to *duplicatus*.

173. **signatipes**, Cress. Trans. Am. Ent. Soc. i, p. 308, ♀.

Hab.—Can., N. H., Mass., Pa. A robust ferruginous species, with head and thorax more or less black; annulus on antennæ, scutellum and annulus on tibiæ yellowish; wings subhyaline; tips of posterior femora and tips of tibiæ black, femora robust; antennæ with short thick-set joints. Length ♀ .40—.45 inch.

174. **annulipes**, Cress. Proc. Ent. Soc. Phil. iii, p. 170, ♀.

pusillus, Cress. id. p. 171, ♀.

Hab.—Can., N. H., Mass., Del., Va. A miniature of *signatipes* with the basal joints of flagellum more elongate; *pusillus* is nothing but a pale variety. Length ♀ .20—.30 inch.

175. **scitulus**, Cress. Trans. Am. Ent. Soc. i, p. 310.

Ischnus scitulus, Cress. Proc. Ent. Soc. Phil. iii, p. 193, ♂.

Hab.—Can., N. H., Mass., Ct., N. Y., Va., Ill. A small and variable species, with black head and thorax, and fulvous or honey-yellow abdomen sometimes more or less varied with dusky; mesothorax often

ferruginous; face, orbits, scutellum, pleura, generally two spots on metathorax behind, and legs except posterior femora and tips of their tibiæ, pale yellowish; antennæ long, black above, with more or less distinct pale annulus, beneath pale. Length ♂ .25—.35 inch.

176. **libens**, n. sp.

♂.—Small, shining, fulvo-ferruginous, vertex, occiput, pro- and mesothorax black; antennæ blackish above, fulvous beneath; head beneath antennæ, orbits broad on cheeks, collar, margins of prothorax, sometimes two short lines on disc of mesothorax, tegulæ, line beneath, scutellums, most of pleura, two spots on metathorax behind and all the coxæ, white or yellowish-white; wings hyaline, iridescent; mesothorax sometimes more or less black. Length .25—.30 inch.

Hab.—N. Y., N. J., Ill.

177. **seminiger**, Cress. Proc. Ent. Soc. Phil. iii, p. 167, ♀.

Hab.—Can., Mass., N. Y., N. J., Pa., Va., Ill. A robust ferruginous species, with metathorax, pleura and basal margin of abdominal segments three and four more or less black; antennæ robust, with pale annulus; scutellum yellowish; wings pale fusco-hyaline; legs ferruginous with coxæ, trochanters and sometimes tips of posterior femora within, black. Length ♀ .45 inch.

178. **flebilis**, n. sp.

♀.—Subrobust, dull ferruginous; pleura, flanks of metathorax, and posterior coxæ and trochanters, black; antennæ rather slender, with white annulus, basal joints of flagellum elongate, first joint of which is much longer than second, before annulus the joints are ferruginous, beyond black; mesothorax and scutellum shining, finely punctured; wings subhyaline; legs slender, tips of posterior tibiæ and their tarsi dusky; abdomen with second and third segments closely punctured, apical segments smooth and polished, postpetiole sciculated, gastrocœli small, moderately deep. Length .47 inch.

Hab.—Canada.

179. **sequax**, Cress. Proc. Cal. Acad. 1877.

Hab.—Vancouver's Island. Resembles *flebilis*, but the flagellum is entirely black. Length ♀ .47 inch.

180. **hiemalus**, Cress. Proc. Cal. Acad. 1877.

Hab.—Aleutian Islands. A small ferruginous species with black metathorax and pleura; antennæ pale ferruginous, apical joints black; wings subhyaline. Length ♀ .30 inch.

181. **subfulvus**, Cress. Proc. Ent. Soc. Phil. iv, p. 258, ♀.

Hab.—Colorado. A rather small, pale ferruginous, shining species with long and slender antennæ, strongly attenuated at tips; apical margins of abdominal segments two to five narrowly black; wings subhyaline. Length ♀ .35—.40 inch.

182. **cestus**, Cress. Proc. Cal. Acad. 1877.

Hab.—Vancouver's Island. A subrobust ferruginous species with broad black band at base of third abdominal segment; antennæ dusky at tips; wings yellowish, subfasciate with fuscous before stigma. Length ♀ .40 inch.

183. **vicinus**, Cress. Proc. Ent. Soc. Phil. iii, p. 169, ♀.

Hab.—Illinois. A subrobust ferruginous species, with tips of antennæ, tips of posterior femora and of their tibiæ, and narrow basal margin of abdominal segments three and four, black; scutellum yellowish; antennæ short, with white annulus, basal joints ferruginous, joints beyond annulus subdilated; wings subhyaline. Length ♀ .40 inch.

184. **brevipennis**, Cress. Proc. Ent. Soc. Phil. iii, p. 174, ♀.

var. *obsoletus*, Riley, 9th. Mo. Rep. p. 55.

Hab.—Can., Pa., Col. A short robust dull ferruginous species, with dusky wings and basal margins of abdominal segments narrowly black; antennæ robust with short thick-set joints, apex dusky or black; the type from Colorado has shortened wings, and in the variety *obsoletus* the black bands on abdomen are obsolete. Length ♀ .40—.45 inch.

This is a parasite on *Leucania albilinea*.

185. **longulus**, Cress. Proc. Ent. Soc. Phil. iii, p. 171, ♂.

Hab.—Can., Col., N. Mex., Cal., Van. An elongate fulvo-ferruginous species, with antennæ, sutures of thorax, generally the pleura beneath, tips of posterior tibiæ, and basal margin of abdominal segments, more or less black; wings yellowish-hyaline; face, scape beneath, scutellum and legs in front yellowish; postpetiole minutely aciculated, gastrocoeli rather deep. Length ♂ .50—.60 inch.

186. **volens**.

Ischnus volens, Cress. Proc. Ent. Soc. Phil. iii, p. 192, ♂.

Hab.—Can., N. Y., Va., Ga., Ill. Closely resembles *longulus*, but separated at once by the smooth polished postpetiole and subobsolete gastrocoeli; the antennæ are dusky above and pale beneath, with a more or less distinct pale yellowish annulus; the four anterior coxæ and trochanters are whitish; wings hyaline. Length ♂ .55—.60 inch.

187. **propitius**, Cress. Trans. Am. Ent. Soc. iv, p. 156, ♂.

Hab.—Texas, (coll. Belfrage). Yellowish-ferruginous; face, clypeus, anterior orbits and mandibles, pale yellow; antennæ pale ferruginous

beneath, blackish above, with broad yellowish-white annulus above middle; prothorax blackish anteriorly, the anterior margin pale yellow; margins and sutures of thorax blackish, as well as scutellar region and pleura centrally beneath; scutellum yellow; metathorax blackish at tip; wings hyaline; four anterior coxæ yellowish beneath; apices of posterior pair, tips of their femora, apical half of their tibiæ and tips of their tarsi black, basal half of their tibiæ yellow; abdomen opaque, base of first segment and apical margins of second and third segments black and shining. Length ♂ .30 inch.

188. **disparilis**, Cress. Trans. Am. Ent. Soc. i, p. 307, ♀.

Hab.—Connecticut. Dull ferruginous, with antennæ, tips of posterior femora, and disc of second and third abdominal segments black; abdomen short, robust, with pale annulus, the joints beyond strongly compressed and dilated; orbits, scutellum and four anterior coxæ whitish; wings clear; abdomen strongly narrowed to base, closely punctured. Length ♀ .43 inch.

189. **russatus**, Cress. Proc. Cal. Acad. 1877, ♀.

Hab.—Vancouver's Island. Entirely ferruginous, except sutures of thorax and tips of antennæ which are blackish; joints of antennæ short and thick-set; wings subhyaline; three basal segments of abdomen very densely sculptured, postpetiole flat. Length ♀ .40 inch.

190. **semissis**, Cress. Proc. Cal. Acad. 1877, ♀.

Hab.—California. Entirely ferruginous, with slender antennæ and yellowish wings. Length ♀ .45 inch.

191. **scibilis**, n. sp.

♂.—Elongate, narrow, subcylindrical, ferruginous, thorax shining; face, clypeus, scape beneath, tegulæ, scutellum, and four anterior coxæ and trochanters yellow; antennæ slender, dusky at tips; sutures of thorax, pleura beneath, lateral regions of scutellum, and tips of posterior femora and of their tibiæ, black; wings subhyaline; legs slender; postpetiole narrow, shining, very minutely aciculated, gastrocoeli subobsolete. Length .45 inch.

Hab.—Illinois.

192. **mucronatus**, Prov. Nat. Can. vii, p. 81, ♂.

Hab.—Can., Va. A rather small, pale ferruginous species, with subclavate abdomen, and easily recognized by the two acute spines on metathorax; the antennæ above, lateral regions of scutellum, posterior trochanters, extreme tips of their femora, tips of their tibiæ, and their tarsi, black; face, clypeus, annulus on antennæ, scutellum and four anterior coxæ and trochanters, pale yellow; wings clear; abdomen finely not closely punctured, slender at base, postpetiole narrow, polished, gastrocoeli obsolete. Length ♂ .40—.45 inch.

193. **proximus.**

Phygadeuon proximus, Prov. Nat. Can. vi, p. 283, ♀.

Hab.—Can., N. H. A small ferruginous species, with yellowish scutellum and spot on tip of abdomen; antennæ robust, black, with pale annulus; abdomen smooth and *impunctured;* wings subhyaline; legs robust, posterior femora and tips of their tibiæ, also sutures of thorax, black. Length ♀ .35 inch.

194. **nanus**, n. sp.

♀.—Small, subrobust, ferruginous, back of head and thorax more or less varied with black; antennæ stout, with short thick-set joints, black, with white annulus, the joints beyond middle thickened; line on collar, tegulæ, sometimes a spot in front and line beneath, four anterior coxæ and all the trochanters, pale yellowish; wings hyaline; legs robust, tips of posterior femora more or less, tips of their tibiæ and sometimes their coxæ above, black; occasionally the posterior femora are entirely black, the tibiæ and tarsi are yellowish-ferruginous; abdomen entirely ferruginous, postpetiole indistinctly sculptured. Length .25 inch.

Hab.—Can., N. Y., N. J., Va., N. C., Ill. This is one of our smallest species, nearly allied to *annulipes;* the thorax varies much in color.

195. **rubicundus**, Cress. Proc. Ent. Soc. Phil. iii, p. 176, ♀.

Hab.—Can., Ill., Tex. A small, subrobust, opaque ferruginous species, with the mesothorax and second abdominal segment strongly punctured; wings subhyaline; antennæ of ♀ with a whitish annulus, that of ♂ entirely ferruginous; abdomen densely sculptured; the lateral angles of metathorax are prominent spiniform, quite acute in the ♂. Length ♂ ♀ .30—.33 inch.

196. **residuus**, Say, Contrib. Macl. Lyc. i, p. 73.

Hab.—Mass., Pa., Md. A small robust pale ferruginous species, with clear wings, readily recognized by the broad, very short clypeus the apical margin of which is broadly arcuated, exposing most of the mentum; the antennæ are short, with thick-set joints, middle joints yellowish and apical ones blackish; legs short and robust; abdomen short, finely punctured, gastrocoeli obsolete, postpetiole sparsely punctured. Length ♀ .30 inch.

197. **facetus**, Cress. Trans. Am. Ent. Soc. i, p. 311, ♂.

Hab.—W. Va., Ill. A small slender pale fulvous species, with the vertex, occiput, antennæ and mesothorax more or less, black; remainder of head, broad annulus on antennæ, most of prothorax, scutellum, pleura and four anterior coxæ and trochanters, white; antennæ long, pale at base beneath; wings hyaline, iridescent; post-

petiole smooth and polished, gastrocoeli obsolete; the mesothorax is generally mostly fulvous. Length ♂ .32—.36 inch.

198. **soror,** Cress. Proc. Ent. Soc. Phil. iii, p. 185, ♀.

Hab.—Can., Mass., N. Y., Ill. Same size and color as *residuus*, but with the clypeus of usual shape, the apical margin not arcuated, and the apical segment of the abdomen has a more or less distinct yellow spot.

199. **utilis,** Cress. Trans. Am. Ent. Soc. i, p. 311, ♂.

Hab.—Mass., Ct., N. Y. This is a small fulvous species, with short broad face, orbits, tegulæ, line before, scutellum and four anterior coxæ and trochanters, pale yellow; antennæ fuscous above, without pale annulus; wings clear, iridescent. Length ♂ .30—.35 inch.

This is probably the ♂ of *soror*.

200. **petulcus,** Cress. Proc. Cal. Acad. 1877, ♀.

Hab.—California. Closely allied to *soror* but with the antennæ entirely ferruginous, and the apical segment of abdomen without yellowish spot. Length ♀ .26 inch.

201. **? rutilus,** Cress. Proc. Ent. Soc. Phil. iii, p. 169, ♀.

Hab.—Virginia. A ferruginous species, the antennæ long, slender, black, with white annulus on flagellum; mouth, sutures of thorax, scutellar region, tips of posterior tibiæ and base of their tarsi black, remainder of their tarsi and scutellum white; wings clear; metathorax with two prominent tubercles. Length ♀ .42 inch.

This looks much like a *Cryptus* the ovipositor being longer than is usual in *Ichneumon;* it seems intermediate between the latter and *Hoplismenus*.

HOPLISMENUS, Grav.

Body black, immaculate.
  Legs black and yellow.
    Posterior tibiæ fuscous.....1. **flavitarsis.**
    Posterior tibiæ and tarsi entirely bright yellow. .....2. **morulus.**
  Legs fulvous or ferruginous.....3. **pacificus.**
Body black; segments 1—3 of abdomen and femora ferruginous; scutellum and tarsi white.....4. **scutellatus.**

1. **flavitarsis.**

Trogus flavitarsis, Cress. Proc. Ent. Soc. Phil. iv, p. 264, ♂.

Hab.—Colorado. Slender, black; face, clypeus and tips of tarsi white; four anterior tibiæ and base of tarsi yellowish; four anterior femora, posterior tibiæ and basal joint of their tarsi fuscous; wings uniformly fuliginous. Length ♂ .53 inch.

2. **morulus.**

Ichneumon morulus, Say, Contrib. Macl. Lyc. i, p. 73.

Ichneumon calcaratus, Prov. Nat. Can. vii, p. 49, ♂.

Hab.—Can., Ct., N. Y., N. J., Va. Black; face, clypeus, scape beneath, and sometimes spot on scutellum ♂, and annulus on flagellum ♀, white or pale yellowish; tibiæ and tarsi bright yellow; wings uniformly fuliginous. Length ♂ ♀ .60—.65 inch.

3. **pacificus**, Cress. Proc. Cal. Acad. Nat. Sci. 1877.

Hab.—Vancouver's Island. Black; annulus on flagellum ♀, and sides of face ♂, white; clypeus and scape beneath ♂, and legs ♂ ♀, fulvous; tips of posterior tibiæ and base of their tarsi ♀, blackish; wings uniformly fuliginous, with a strong violaceous reflection. Length ♂ ♀ .56—.70 inch.

4. **scutellatus.**

Ichneumon scutellatus, Prov. Nat. Can. vii, p. 78, ♂.

Hab.—Canada. Black; face, clypeus, spot on scape beneath, annulus on flagellum, scutellum and tarsi white; segments one to three of abdomen, and femora except tips of posterior pair, ferruginous; wings hyaline; scutellum elevated into a transverse subacute edge. Length ♂ .45 inch.

Ichneumonides amblypygi.

Scutellum flat or convex.....**AMBLYTELES.**

Scutellum strongly elevated, subpyramidal.....**TROGUS.**

AMBLYTELES, Wesm.

The following table will readily distinguish the species.

FEMALES.

Metathorax without spines.
- Abdomen black or blue.
  - Posterior legs black or blue, their tibiæ immaculate.
    - Apex of abdomen immaculate; scutellum black or blue.
      - Body black.....1. **exultus.**
      - Body dark steel-blue.....2. **montanus.**
    - Apex of abdomen marked with white; scutellum pale.....3. **tetricus.**
  - Posterior legs black, their tibiæ with white annulus...5. **perluctuosus.**
  - Posterior legs black, their femora ferruginous.....9. **mormonus.**
  - Posterior legs ferruginous, tips of tibiæ and tarsi black.
    - Abdomen fusiform.....10. **Ormenus.**
    - Abdomen narrow, slender.....11. **Belangeri.**
- Abdomen black, with a broad yellow band at base of second and third segments.....14. **bifasciatus.**
- Abdomen black, segments 2 and 3 ferruginous, yellowish at base; apex of 4 and following segments narrowly yellowish.....15. **robustus.**

Abdomen black and ferruginous.
Apex of abdomen black.
Scutellum black; posterior legs entirely black; abdominal segments two and three entirely ferruginous.....17. **rufizonatus.**
Scutellum pale; posterior legs black, base of tibiæ ferruginous.
Antennæ with short, thick-set joints; abdominal segments 2 and 3 entirely ferruginous, apical segments immaculate.....19. **Taos.**
Antennæ with basal joints of flagellum elongate, cylindrical; abdominal segments two to four and apex of one, ferruginous, apical segments with pale spots.....21. **Nortoni.**
Apex of abdomen ferruginous.
Head and thorax black or blue.
Posterior legs entirely black.
Postpetiole aciculated; joint 3 of antennæ much longer than 4.
Thorax deep black.....22. **detritus.**
Thorax steel-blue.....23. **semicæruleus.**
Postpetiole scabrous; third and fourth joints of antennæ equal in length.....24. **indistinctus.**
Posterior legs more or less ferruginous.
Wings fuliginous; scutellum flat, entirely black; antennæ without pale annulus.....25. **hudsonicus.**
Wings hyaline; scutellum convex, with white spot; antennæ with pale annulus.....28. **coloradensis.**
Head and thorax more or less ferruginous.
Abdomen broad, fusiform.
Antennæ with basal joints of flagellum (except first which is twice longer than broad), quadrate or moniliform; thorax beneath and metathorax generally black; abdomen generally entirely ferruginous except base of first and occasionally base of two or three following segments.....29. **subrufus.**
Antennæ with basal joints of flagellum (except first which is three times longer than broad), scarcely twice longer than broad; thorax generally ferruginous with black sutures; abdominal segments generally more or less black at base.....30. **suturalis.**
Antennæ with basal joints of flagellum long, cylindrical, more than twice longer than broad.....31. **subfuscus.**
Abdomen narrow, subcompressed at tip.
Antennæ with pale annulus.....32. **anceps.**
Antennæ without pale annulus.....33. **hiulcus.**
Metathorax with two prominent spines; thorax black and white; legs ferruginous; antennæ long, black with broad white annulus.
Abdomen black, apical margin of segments white.....34. **? concinnus.**
Abdomen ferruginous, with pale spot at sides of three basal segments.
35. **? ornatus.**

MALES.

Abdomen black or blue, immaculate above.
Legs black or blue and white.
Scutellum and entire body blue-black.....2. **montanus.**
Scutellum pale.
Face entirely black.....6. **expunctus.**

Face more or less white.
Abdomen black, the second segment not more coarsely sculptured at base.....7. **ultus.**
Abdomen blue-black, the second segment coarsely and longitudinally rugose on basal middle.....8. **stadaconensis.**
Legs honey-yellow.
Face, posterior tibiæ and their tarsi black.....12. **illætabilis.**
Face yellow; posterior coxæ, tips of their tibiæ and their tarsi more or less black.....13. **luctus.**
Abdomen black, the two or three apical segments more or less marked with white.....4. **improvisus.**
Abdomen black, apical margin of all the segments white...34. **? concinnus.**
Abdomen black, segments 2, 3 and sometimes base of 4 more or less ferruginous.
Scutellum black; posterior legs entirely black; abdominal segments two and three entirely pale ferruginous.....16. **magnus.**
Scutellum pale.
Posterior legs honey-yellow, coxæ black; abdominal segments 2 and 3, sometimes only 3 at base, ferruginous.....18. **quebeccensis.**
Posterior legs black, coxæ, tibiæ and tarsi varied with white...20. **electus.**
Abdomen ferruginous, basal segment only sometimes black.
Scutellum black.....26. **fraternus.**
Scutellum pale yellow or white.....27. **nubivagus.**

All the species of this subgenus, given below, were originally described as belonging to *Ichneumon* proper, except Nos. 3, 5 and 35.

1. **excultus,** Cress. Trans. Am. Ent. Soc. i, p. 293, ♀.

Hab.—Can., N. H., Mass., N. J. A deep black, shining, immaculate species, with apex of abdomen smooth and polished, the wings pale fuliginous, and the antennæ with broad white annulus. Length ♀ .55—.60 inch.

2. **montanus,** Cress. Proc. Ent. Soc. Phil. iii, p. 141, ♂ ♀.

Hab.—H. B. T., Can., Mass., Va., Col., Cal. A dark steel-blue, immaculate species, with dusky wings; the antennæ of ♀ have a broad white annulus, while in the ♂ they are entirely black. The blue color of the ♀ is much brighter than in the ♂ which is opaque. Length ♂ ♀ .50—.60 inch.

Out of eleven ♂ specimens, nine have the longitudinal ventral fold entire on segments two, three and four; the other two specimens have it only on two and three.

3. **tetricus,** Prov. Nat. Can. ix, p. 10, ♀.

Hab.—Canada. A robust deep black species, with annulus on antennæ, scutellum and apex of two or three apical segments, white; wings fuscous. Length ♀ .55—.62 inch.

4. **improvisus**, Cress. Trans. Am. Ent. Soc. i, p. 296, ♂.

Hab.—Can., N. J. A dull black species, with white annulus on antennæ, and the two or three apical segments of abdomen marked with white; the face except median black stripe, scutellum, most of four anterior tibiæ and tarsi and base of posterior tibiæ, are also white; wings dusky; the second and third ventral segments have generally a distinct longitudinal fold, which sometimes extends on half of fourth segment. Length ♂ .60—.65 inch.

This is probably the ♂ of *tetricus*.

5. **perluctuosus**, Prov. Nat. Can. ix, p. 10, ♀ (not ♂).

Hab.—Can., N. H., Van. An elongate, rather narrow, deep black species, with slender antennæ, subhyaline wings, and lateral margin of face, broad annulus on antennæ, line before tegulæ, short one beneath, scutellum and annulus on all the tibiæ, white. Length ♀ .55—.60 inch.

6. **expunctus**, Cress. Trans. Am. Ent. Soc. i, p. 290.

obliteratus, Cress. (nec *Wesm.*) Proc. Ent. Soc. Phil. iii, p. 147, ♂.

Hab.—Colorado. This is a deep black species, with dot on tegulæ, a short line in front, another beneath, scutellum, line on whole length of four anterior tibiæ and short line at base of posterior tibiæ, white; wings dusky at tips; head and antennæ entirely black; an imperfectly formed longitudinal fold on second ventral segment. Length ♂ .55 inch.

7. **ultus**, Cress. Trans. Am. Ent. Soc. i, p. 295, ♂.

var. *rogalis*, Cress. id. p. 295, ♂.

Hab.—Can., N. Y., Ct., W. Va. A dull black species, with face and clypeus more or less, scape beneath, tegulæ, short line in front, another beneath, scutellum, spot behind, all the coxæ more or less, stripe on four anterior femora within, knees, their tibiæ and tarsi and posterior tibiæ except tips, white; wings hyaline; sometimes the posterior tarsi are more or less white and one specimen has the posterior tibiæ entirely black except a short white line near base; ventral segments flat, smooth and polished, in one specimen only the second and third segments have each a longitudinal fold. Length ♂ .60—.70 inch.

8. **stadaconensis**, Prov. Nat. Can. vii, p. 50, ♂.

Hab.—Can., N. H., Mass. This differs from *ultus* principally by the abdomen being strongly tinged with blue, the second and third segments of which are coarsely and longitudinally sculptured at base;

the posterior coxæ are entirely black; the second and third ventral segments have each a longitudinal fold. Length ♂ .55—.60 inch.

9. **mormonus**, Cress. Proc. Cal. Acad. 1877, ♀.

Hab.—Utah. A robust, dull black, immaculate species, with slender entirely black antennæ; wings fuliginous; four anterior legs, except coxæ and trochanters, and posterior femora ferruginous; the posterior tibiæ are thickened at tips and their tarsi short and robust. Length ♀ .46 inch.

10. **Ormenus**, Cress. Proc. Ent. Soc. Phil. iii, p. 141, ♀.

Hab.—Can., Mass., Pa., Col. A deep black immaculate species with ferruginous legs and subhyaline wings; the antennæ are entirely black; apex of abdomen smooth and polished; the coxæ, often the trochanters, tips of posterior tibiæ and their tarsi entirely, are black; abdomen fusiform. Length ♀ .55 inch.

11. **Belangeri**, n. sp.

♀.—Long and slender, deep black, immaculate, apex of abdomen smooth and polished; legs, except coxæ, tips of posterior tibiæ, and their tarsi entirely, black; antennæ slender, with joints nine to fifteen pale *beneath*; wings yellowish-hyaline; abdomen very narrow, acuminate and subcompressed at tip. Length .56 inch.

Hab.—Canada. (Bélanger). This is colored exactly like *Ormenus*, but the abdomen is not more than half the width and the antennæ are more slender. It probably belongs to Wesmael's subgenus *Limerodes*.

12. **illætabilis**, n. sp.

♂.—Black, shining; spot beneath tegulæ, scutellum and spot behind whitish; wings faintly dusky; legs ferruginous; posterior knees, their tibiæ and tarsi, black; postpetiole and second segment coarsely rugose, apical segments shining and subcompressed; ventral segments without longitudinal fold. Length .55 inch.

Hab.—Georgia. (Morrison).

13. **luctus**, Cress. Proc. Ent. Soc. Phil. iv, p. 250.

tenebrosus, Cress. (nec *Wesm.*) Proc. Ent. Soc. Phil. iii, p. 145, ♂.

mellipes, Cress. Trans. Am. Ent. Soc. i, p. 295, ♂.

Hab.—Can., N. H., Col. A black species with honey-yellow or pale ferruginous legs, except coxæ which are black; face, scape beneath and scutellum, yellow; wings yellow-hyaline; second and third ventral segments generally honey-yellow. Length ♂ .55—.65 inch.

14. **bifasciatus**, Prov. Nat. Can. vii, p. 75, ♀.

Hab.—Canada. A shining black species, with annulus on antennæ, scutellum, basal half of tibiæ, broad band at base of second and third

abdominal segments, and spot on two apical segments yellowish-white; wings subhyaline. Length ♀ .50 inch.

15. **robustus**, Cress. Trans. Am. Ent. Soc. i, p. 298, ♀.

Hab.—Canada. A rather large, robust black species, easily recognized by the second and third segments of abdomen being ferruginous, yellowish at base; sides of face, annulus on antennæ, scutellum, most of tibiæ and narrow apical margins of fourth and following segments of abdomen dull yellowish; antennæ slender; wings yellowish-hyaline. Length ♀ .63 inch.

16. **magnus**, Cress. Proc. Ent. Soc. Phil. iii, p. 258, ♂.

Hab.—Colorado. This is a large black species, with second and third abdominal segments entirely pale ferruginous; wings fuscous; ventral segments destitute of longitudinal fold. Length ♂ .90 inch.

17. **rufizonatus**, Cress. Proc. Ent. Soc. Phil. iii, p. 183, ♀.

marianapolitanensis, Prov. Nat. Can. vii, p. 81, ♀.

Hab.—Can., N. J. This is a deep black species with second and third segments of abdomen entirely ferruginous; the antennæ have each a narrow pale annulus; wings subhyaline. Length ♀ .57 inch.

18. **quebecensis**, Prov. Nat. Can. vii, p. 77, ♂.

Hab.—Can., Col. A black species, with legs, except coxæ, and second and third abdominal segments more or less ferruginous; face and scutellum yellow; wings subhyaline; the specimen from Colorado has the abdomen entirely black except a ferruginous band at base of third segment; the second and third ventral segments are yellowish and have each a more or less distinct longitudinal fold. Length ♂ .60 inch.

19. **Taos**, n. sp.

♀.—Shining black; upper anterior orbits, spot on middle of face, mandibles, tegulæ, abdominal segments two and three, ferruginous; face short; antennæ subrobust, with short thick-set joints, seven to fourteen pale yellowish; scutellum flat, pale yellowish; wings pale fusco-hyaline; legs robust, four anterior knees, tibiæ and tarsi, posterior tibiæ except tips and their tarsi, pale ferruginous; abdomen finely punctured, apical segments smooth and polished, postpetiole rather broad, smooth, gastrocoeli obsolete. Length .47 inch.

Hab.—New Mexico.

20. **electus**, Cress. Trans. Am. Ent. Soc. i, p. 304, ♂.

nitidus, Prov. Nat. Can. vii, p. 79, ♂.

Hab.—Can., Ct. This is black, with second, third and base of fourth abdominal segments ferruginous; face, scape beneath, tegulæ,

line before, one beneath, scutellum, spot behind, spot on disc of metathorax, spot on all the coxæ, four anterior legs mostly, posterior tibiæ except tips, and sometimes their tarsi entirely, whitish; wings clear; the second and sometimes the third ventral segments have a longitudinal fold. Length ♂ .60 inch.

21. **Nortoni**, Cress. Trans. Am. Ent. Soc. i, p. 304, ♀.

Hab.—Connecticut. A rather slender black species, with abdominal segments two to four entirely, and apex of one, ferruginous; dot on each side of ocelli, annulus on antennæ, scutellum and two spots at tip of abdomen, yellowish-white; wings hyaline; antennæ and legs slender; head broader than usual. Length ♀ .45 inch.

22. **detritus**, Brullé, Hym. p. 302.

Syphax, Cress. Proc. Ent. Soc. Phil. iii, p. 181, ♀.

Hab.—Can., Me., Mass., N. Y., Pa., N. J., Del. This is a black species, with the abdomen, except first segment, ferruginous; the antennæ are slender, with a broad white annulus on each, the third joint is longer than the fourth; the wings vary from subhyaline to dark fuliginous; the scutellum has occasionally a white spot; postpetiole finely aciculated. Length ♀ .50—.60 inch.

23. **semicæruleus**, Cress. Trans. Am. Ent Soc. i, p. 302, ♀.

Hab.—Can., N. H., W. Va. Distinguished at once from *detritus* by the beautiful steel-blue head and thorax and clear wings; the scutellum is more or less white. Length ♀ .50 inch.

24. **indistinctus**, Prov. Nat. Can. vii, p. 75, ♀.

Hab.—Can., N. H., Mass., Ga. This is colored exactly like *detritus*, but is easily separated by the scabrous postpetiole, and by the third and fourth joints of antennæ being equal in length; the scutellum has frequently a pale spot. Length ♀ .50—.55 inch.

25. **hudsonicus**, n. sp.

♀.—Black; anterior orbits, broad on face, mandibles, scape beneath, tegulæ, legs except coxæ and base of trochanters, and abdomen except first segment, ferruginous; wings fuliginous; third joint of antennæ longer than fourth; postpetiole finely aciculated; gastrocoeli small, foveiform. Length .52 inch.

Hab.—Hudsons Bay Territory.

26. **fraternus**, n. sp.

♂.—Black; face, clypeus, scape beneath, four anterior legs except coxæ, trochanters and their femora behind, posterior tibiæ except tips, and their tarsi, yellow; wings yellowish-hyaline; abdomen except first segment ferruginous. Length .70 inch.

Hab.—Mass., Va. Very much like *nubivagus*, but at once separated by the black scutellum.

27. **nubivagus**, Cress.

consimilis, Cress. (nec *Westm.*) Proc. Ent. Soc. Phil. iii, p. 163, ♂.

var. *juxta*, Cress. Proc. Ent. Soc. Phil. iii, p. 163, ♂.

æqualis, Prov. Nat. Can. vii, p. 76, ♂.

Hab.—Can., Me., Mass., Pa., Va., Col. Black, with abdomen except first segment, ferruginous; face, scape beneath, tegulæ and scutellum pale yellowish; four anterior legs, posterior tibiæ except tips, and their tarsi yellowish; the var. *juxta* has the first segment of abdomen entirely ferruginous. Length ♂ .60—.70 inch.

28. **coloradensis**, n. sp.

♀.—Small, black; narrow anterior orbits, short line behind summit of eyes, interrupted annulus on antennæ, line before tegulæ, short line beneath, and spot at apex of abdomen, white; wings hyaline; legs ferruginous, coxæ, trochanters, base of four anterior femora, tips of posterior tibiæ and their tarsi, black; abdomen ferruginous, finely punctured, shining, postpetiole with a distinct medial fovea, gastrocoeli small, foveiform. Length .32 inch.

Hab.—Colorado.

29. **subrufus**, Cress. Proc. Ent. Soc. Phil. iii, p. 168, ♀.

Hab.—Can., Me., Mass., N. Y., Va., Ill. A robust, pale ferruginous species, with pleura and metathorax more or less black; scutellum pale yellowish; antennæ short, stout, with short thick-set joints, apex black middle joints more or less pale; wings pale fusco-hyaline; postpetiole finely aciculated, gastrocoeli small, foveiform. Length ♀ .50—.55 inch.

30. **suturalis**, Say, Bost. Jour. Nat. Hist. i, p. 226.

propinquus, Cress. Proc. Ent. Soc. Phil. iii, p. 172, ♀.

Hab.—Can., Mass., N. Y., N. J., Pa., Del., Va., Ill., Col., N. M., Utah, Dac. A robust ferruginous species, with thoracic sutures and basal margins of abdominal segments more or less black; wings pale fusco-hyaline; antennæ ferruginous at base, black at tips and more or less yellowish in middle. Length ♀ .45—.55 inch.

Quite a common species. The last ventral segment varies much in length, sometimes appearing small and at other times quite large.

31. **subfuscus**, Cress. Proc. Ent. Soc. Phil. iii, p. 173, ♀.

Hab.—Col., Nev., Cal. Very closely allied to *suturalis*, but easily distinguished by the long slender antennæ, with basal joints of flagellum long and cylindrical; the black bands on base of abdominal segments are sometimes subobsolete. Length ♀ .50 inch.

32. **anceps**, Cress. Trans. Am. Ent. Soc. i, p. 309, ♂ ♀.

Hab.—Ct., Del. A long slender, shining, pale ferruginous species, with yellowish hyaline wings, and yellow scutellum; flagellum fuscous

with broad yellowish annulus; sutures of thorax, tips of posterior femora and of their tibiæ, and sometimes the base and tip of apical segments of abdomen, black; abdomen narrow, polished, subcompressed at tip. Length ♀ .55 inch.

This and the next species seem to belong to Wesmael's subgenus *Limerodes*.

33. **hiulcus**, Cress. Proc. Cal. Acad. 1877, ♀.

Hab.—British Columbia. Same form and appearance as *anceps*, but the flagellum is without a pale annulus, being ferruginous with blackish tip. Length ♀ .48 inch.

34. ? **concinnus**, Say, Contrib. Macl. Lyc. i, p. 68 ♂ (not ♀).

Hab.—N. C., Ill. A slender black species with very large buccate head, long antennæ and bispinose metathorax; the head, thorax and abdomen are marked with white; wings clear; legs slender and honey-yellow; the antennæ which are thickened at tips, have each a broad whitish annulus beyond the middle; scutellum raised, but not gibbose, sides strongly carinate. Length ♂ ♀ .42 inch.

This species and the next (*ornatus*) will probably form a new genus, being intermediate between *Hoplismenus* and *Amblyteles*. The specimens before me agree precisely with Say's description of *I. concinnus*, except that of his ♀, which is evidently a *Cryptus*, the ovipositor being nearly half the length of the abdomen.

35. ? **ornatus**.

Hoplismenus ornatus, Cress. Trans. Am. Ent. Soc. ii, p. 92, ♀.

Hab.—New York. Head and thorax black, elaborately ornamented with white; scape, legs and abdomen ferruginous; antennæ long, slender, flagellum black with a broad white annulus; metathorax with two sharp spines; wings clear. Length ♀ .35 inch.

This is not an *Hoplismenus* as defined by Wesmael, the scutellum being flat, and the last ventral segment is not retracted.

TROGUS, Grav.

♀.—*Abdomen flattened above, the segments strongly constricted at base; head narrowed beneath, cheeks flat.*

Body entirely black; tibiæ and tarsi yellow.....1. **fulvipes.**

Body black and ferruginous, fulvous or yellow.

Thorax more or less black.

Wings dark fuliginous; abdominal segments two to five with discal black spot.....2. **Edwardsii.**

Wings and abdomen yellow.....4. **flavipennis.**

Thorax entirely ferruginous; abdomen ferruginous, black at tip; wings yellow, with two broad black bands.....3. **fascipennis.**

Body entirely fulvo-ferruginous; wings dark fuliginous.....5. **exesorius.**

‡‡.—*Abdomen convex or subconvex, the segments not unusually constricted at base; head more or less buccate.*

Body and wings *blue*-black, immaculate; antennæ black...6. **atrocæruleus.**
Body black, immaculate.
Wings uniformly dark fuliginous; antennæ orange-yellow.
Postpetiole elevated and subpyramidal before apex.....8. **Brullei.**
Postpetiole not elevated, bicarinate before apex.....7. **obsidianator.**
Wings yellow, smoky on apical margins; antennæ black; postpetiole not elevated before apex .....9. **marginipennis.**
Body black, more or less marked with fulvous or ferruginous.
Abdomen entirely black; head, pro- and mesothorax, and sometimes scutellum and disk of metathorax fulvo-ferruginous...12. **austrinus.**
Abdomen black, second segment with broad ferruginous band...10. **atrox.**
Abdomen black, apical half fulvo-ferruginous.....11. **apicalis.**
Abdomen black, basal segments more or less fulvo-ferruginous.
Wings fuliginous.
Thorax black beneath.....14. **occidentalis.**
Thorax entirely fulvo-ferruginous.....13. **nubilipennis.**
Wings yellow, apical margins fuliginous.
Antennæ yellow, black at tips.....15. **quebecensis.**
Antennæ black, scape yellow beneath.....16. **Bolteri.**
Abdomen entirely ferrug'nous, except base of first segment.
Posterior legs entirely black.....17. **Copei.**
Posterior tibiæ and tarsi fulvo-ferruginous.....18. **canadensis.**
Body entirely fulvous or ferruginous.
Wings dark fuscous.
Postpetiole elevated and subpyramidal before apex.....19. **Rileyi.**
Postpetiole not elevated, rather depressed.....21. **buccatus.**
Wings yellow, apical margins smoky .....20. **mellosus.**
Wings yellow, a large spot at tip and triangular mark at apex of externo-medial cell, violaceous-black.....22. **elegans.**

§

1. **fulvipes,** Cress. Trans. Am. Ent. Soc. ii, p. 93, ♂.
obsidianator, Prov. (*not* Brullé) Nat. Can. vi, p. 335, ♂.

Hab.—Me., N. H. Black; labrum, knees, tibiæ and tarsi yellow; wings fuliginous, with an æneous reflection; the ♂ has the anterior legs except coxæ entirely yellow. Length ♂ ♀ .60—.65 inch.

2. **Edwardsii,** Cress. Proc. Cal. Acad. Nat. Sci. 1877.

Hab.—Vancouver's Island. Black; face, antennæ beneath, tegulæ, scutellum and abdomen, except black spot on disc of segments two to five, fulvo-ferruginous; legs yellow, coxæ black; wings fuliginous, with an æneous reflection. Length ♂ .72 inch.

3. **fascipennis,** n. sp.

♀.—Ferruginous; antennæ, posterior legs, except coxæ and base of their tibiæ, and two apical segments of abdomen, black; face, clypeus, scape beneath, and basal third of posterior tibiæ, yellowish; wings bright yellow, a broad band a little before the middle and a broader one at tip, blackish;

abdomen depressed, postpetiole and three following segments above coarsely, longitudinally aciculated. Length .70 inch.

Hab.—Texas. (F. H. Strecker). Easily distinguished by the beautifully ornamented wings.

4. **flavipennis,** Cress. Proc. Ent. Soc. Phil. iii, p. 287.

Hab.—Colorado. Head, antennæ except tips, tegulæ, scutellum, anterior femora, and all the tibiæ and tarsi, fulvo-ferruginous; tips of antennæ, thorax, coxæ, posterior femora and first abdominal segment except tip, black; wings yellow, apical margins smoky; abdomen yellow, postpetiole and second segment fulvous. Length ♂ .70 inch.

5. **exesorius,** Brullé, Hym. p. 298.

Hab.—Can., N. Y., Pa., Del., Ga., Ill. Entirely fulvo-ferruginous, legs paler, tibiæ and tarsi golden-yellow; antennæ sometimes dusky or black above; wings uniformly fuliginous, with a strong æneous or violaceous reflection. Length ♂ ♀ .70—.80 inch.

This will probably prove to be the *Ichneumon pennator,* Fabr. Ent. Syst. ii, p. 155.

§ §

6. **atrocæruleus,** Cress. Trans. Am. Ent. Soc. ii, p. 92, ♀.

Hab.—Louisiana, (coll. Norton). Opaque blue-black, immaculate; wings blackish fuliginous, with a brilliant violaceous reflection; fourth and following segments of abdomen smooth and polished. Length ♀ .80 inch.

7. **obsidianator,** Brullé, Hym. p. 299.

Hab.—Pa., Ill., Ga., Tex. Deep black, immaculate; antennæ orange-yellow; wings uniformly blackish-fuliginous, with a strong æneous reflection; first abdominal segment bicarinate, the carinæ becoming obsolete before reaching the tip. Length ♂ ♀ .80—.90 inch.

8. **Brullei,** n. sp.

♂ ♀.—Differs from *obsidianator* principally by the first abdominal segment being strongly elevated and subpyramidal before apex; the anterior margin of clypeus is slightly produced in middle, while in *obsidianator* it is more or less concave, sometimes broadly emarginate; the abdominal segments are also more finely punctured. Length ♂ ♀ .85—1.10 inch.

Hab.—Ct., Pa., Ga.

9. **marginipennis,** Cress. Trans. Am. Ent. Soc. ii, p. 93, ♂.

Hab.—Dakota Territory. Black, immaculate; wings yellow, with apex broadly pale fuliginous; first abdominal segment not elevated before apex. Length ♂ .72 inch.

10. **atrox,** Cress. Trans. Am. Ent. Soc. ii, p. 93, ♀.

Hab.—Dakota Territory. Black, second abdominal segment with a broad transverse ferruginous spot; wings fuscous, stigma fulvous; first abdominal segment not elevated before apex. Length ♀ .62 inch.

11. **apicalis,** n. sp.

♀.—Deep black; a yellow spot on each side of face; third and following segments of abdomen fulvo-ferruginous; wings violaceous-black; four anterior tibiæ and tarsi obscure fulvous; anterior margin of clypeus straight; scutellum obtusely elevated; abdomen subconvex, postpetiole coarsely punctured, disc not elevated. Length .75 inch.

Hab.—Georgia. (Morrison).

12. **austrinus,** Cress. Trans. Am. Ent. Soc. ii, p. 92, ♂ ♀.

Hab.—Ga, Fla. Black; head, pro- and mesothorax, occasionally the scutellum and disc of metathorax, anterior legs and intermediate tibiæ and tarsi, fulvous; antennæ orange-yellow, sometimes dusky at tips; wings blackish-fuliginous, with a strong æneous reflection; first abdominal segment not elevated before apex. Length ♂ ♀ .85 inch.

13. **nubilipennis,** Hald. Proc. Acad. Nat. Sci. Phil. iii, p. 127.

Hab.—Can., Pa., Va., Ga. Fulvo-ferruginous, third and following abdominal segments black; ♀ antennæ black with broad yellowish annulus; ♂ antennæ black, slightly tinged with yellowish beneath toward tips; face and scape beneath of ♂, and the tibiæ except tips, and tarsi yellow; wings dark fuscous, with a strong æneous reflection, stigma fulvous; first abdominal segment elevated and subpyramidal before apex. Length ♂ ♀ .85 inch.

14. **occidentalis,** Cress. Trans. Am. Ent. Soc. ii, p. 93, ♂.

Hab.—Dakota Territory. Fulvous; stripe on each side of prothorax, stripe on anterior middle of mesothorax, most of pleura, base and flanks of metathorax, coxæ, base of third abdominal segment and the following segments except sides of fourth and narrow apical margin of fourth and fifth, all black; wings fuscous, the base irregularly and streak in marginal cell yellow, stigma and costal vein fulvous; first abdominal segment strongly elevated and subpyramidal before apex. Length ♂ .85 inch.

15. **quebecensis,** Prov. Nat. Can. vi, p. 335, ♀.

Hab.—Canada, (coll. Provancher). Large, pale fulvous; tips of antennæ, three broad stripes on mesothorax, sides of thorax and beneath, metathorax and fourth and following abdominal segments

except lateral margin of fourth, black; wings yellow, apical margins fuliginous; scutellum gibbous, convex; prominent disc of metathorax polished and fulvous; apex of posterior femora within blackish; first abdominal segment strongly elevated and subpyramidal before apex. Length 1 inch.

16. **Bolteri**, Cress. Trans. Am. Ent. ii, p. 94, ♂.

Hab.—Lake Superior, (coll. Bolter). Black; face, orbits, clypeus, mandibles and palpi lemon-yellow; tegulæ, spot before, and scutellum, fulvous; wings yellow, slightly dusky at tips; legs yellow, varied with fulvous, posterior coxæ at base and their femora behind black, extreme tips of their tibiæ within and basal joint of their tarsi dusky; first segment of abdomen except base, second entirely, third except base and ventral segments two to five, yellowish-fulvous; basal segment gibbous before apex. Length ♂ .85 inch.

17. **Copei**, Cress. Trans. Am. Ent. Soc. ii, p. 94, ♂.

Hab.—West Virginia. Black; white spot on each side of face; abdomen, except petiole, entirely fulvo-ferruginous; wings blackish-violaceous. Length ♂ .82 inch.

18. **canadensis**, Prov. Nat. Can. ix, p. 2.

Copei, Prov. (*not* Cress.), Nat. Can. vi, p. 335, ♂ ♀.

Hab.—Canada. Black; tibiæ, tarsi and abdomen except petiole, fulvous; wings uniformly dark fuliginous, with a strong æneous reflection; antennæ sometimes varied with fulvous; first abdominal segment elevated and subpyramidal before apex. Length ♂ ♀ .90—.95 inch.

Quite distinct from *Copei*.

19. **Rileyi**, Cress. Trans. Am. Ent. Soc. ii, p. 95, ♀.

Hab.—Illinois, (coll. Riley). Large, ferruginous; tips of mandibles and of antennæ, black; wings fuscous, with a golden gloss, stigma fulvous, nervures black; basal third of marginal cell, base of both wings and a costal streak on posterior pair yellow; legs and thorax beneath golden-sericeous; first segment of abdomen elevated and subpyramidal before apex. Length ♀ 1.08 inch.

20. **mellosus**, Cress. Rep. Wheeler Exp. p. 708, ♀.

Hab.—New Mexico. Large, fulvous; head, antennæ except tips, and tibiæ and tarsi yellow; tips of antennæ and narrow basal margin of third abdominal segment black; a fuscous stripe over tegulæ; wings yellow, apical margins fuliginous; scutellum elevated, convex; first abdominal segment elevated and subpyramidal before apex. Length ♀ 1 inch.

21. **buccatus**, Cress. Proc. Cal. Acad. Nat. Sci. 1877.

Hab.—Vancouver's Island. Rather small, robust, uniformly fulvo-ferruginous; antennæ black, fulvous at base; wings blackish-violaceous; head quadrate, cheeks swollen; postpetiole not elevated. Length ♀ .60 inch.

22. **elegans**, Cress. Trans. Am. Ent. Soc. ii, p. 94, ♀.

Hab.—Maine. Honey-yellow, with a fine golden sericeous pile especially on legs and abdomen; the face, tarsi and tip of abdomen paler; base and tips of antennæ tinged with fuscous; wings yellowish, with a brilliant golden gloss, a triangular mark at tip of externo-medial cell and a large irregular cloud at tip of anterior wing, black; stigma yellow; abdomen darker colored at base. Length ♀ .75 inch.

Ichneumonides platyuri.

Scutellum carinate laterally.....**PLATYLABUS.**
Scutellum not carinate laterally.....**EURYLABUS.**

PLATYLABUS, Wesm.

Body steel-blue.....1. **clarus.**
Body black and ferruginous.
Abdomen black, second segment only ferruginous.....2. **scutellatus.**
Abdomen entirely ferruginous or black at extreme base and apex.
Antennæ without pale annulus; head and thorax black.....3. **consors.**
Antennæ with pale annulus.
Metathorax black.
Basal joints of flagellum ferruginous; scutellum with white spot at tip.....4. **canadensis.**
Basal joints of flagellum black; scutellum white.....5. **montanus.**
Metathorax ferruginous.
Scutellum white.
Abdomen ferruginous, black at tip.....6. **signatus.**
Abdomen entirely ferruginous.....7. **ornatus.**
Scutellum ferruginous or black.
Abdomen ferruginous, black at tip.....8. **thoracicus.**
Abdomen entirely ferruginous.....9. **4-carinatus.**
Body entirely ferruginous.
Antennæ without pale annulus.....10. **californicus.**
Antennæ with pale annulus.....11. **lineolatus.**

1. **clarus.**

Ichneumon clarus, Cress. Trans. Am. Ent. Soc. i, p. 297, ♀.

Hab.—N. H., Mass. A beautiful steel-blue species, with clear wings, white annulus on antennæ, and generally a white spot on scutellum; sometimes the thorax is tinged with green. The ♂ is less shining, narrower, with face, clypeus and four anterior coxæ beneath white; flagellum entirely black. Length ♂ ♀ .40—.55 inch.

2. **scutellatus.**

Ischnus scutellatus, Prov. Nat. Can. vii, p. 111, ♂.

Hab.—Canada, (coll. Provancher). This is black, with narrow line on sides of face, scutellum and spots on tip of abdomen, white; four anterior legs and base of femora varied with ferruginous; second abdominal segment dull ferruginous. Length ♂ .28 inch.

3. **consors,** Cress. Proc. Cal. Acad. Nat. Sci. 1877.

Hab.—California. Black, with sides of face white; femora and abdomen ferruginous; wings hyaline; flagellum entirely black. Length ♂ .33 inch.

4. **canadensis,** n. sp.

♀.—Black; most of legs and abdomen, except base and apex ferruginous; antennæ longer than body, very slender, four basal joints of flagellum ferruginous, joints nine to thirteen white; transverse spot above base of mandibles and one at tip of scutellum white; wings hyaline; coxæ, trochanters, tips of posterior femora and of their tibiæ, first segment of abdomen except tip, and the two or three apical segments, black. Length .35 inch,

Hab.—Canada.

5. **montanus,** n. sp.

♀.—Black; short line on anterior orbits, narrow annulus on antennæ, dot or line before tegulæ, one beneath, and large spot on scutellum, white; wings hyaline; femora and abdomen ferruginous, base of first segment and sometimes two apical segments black. Length .30—.32 inch.

Hab.—White Mts., N. H. (Morrison).

6. **signatus.**

Phygadeuon signatus, Prov. Nat. Can. vi, p. 282, ♀.

Hab.—Canada. Black; anterior orbits, interrupted on each side of antennæ, spot on each side of clypeus, annulus on antennæ, line before tegulæ, short one beneath, and scutellum, white; spot on sides of pleura, metathorax, legs and abdomen ferruginous; tips of posterior femora and of their tibiæ, and apex of abdomen black, apical margin of last two segments white; wings clear; antennæ much shorter than usual. Length ♀ .32 inch.

7. **ornatus.**

Phygadeuon ornatus, Prov. Nat. Can. vii, p. 181, ♀.

Hab.—Canada. Ferruginous; head, antennæ, prothorax and stains on mesothorax, black; antennæ long; orbits, broadest on face, spot on mandibles, narrow annulus beyond middle of flagellum, anterior margin of prothorax, spot on tegulæ, line before, short one beneath, scutellum and spot on anterior coxæ, white; wings clear. Length ♀ .32 inch.

8. **thoracicus.**

Hoplismenus thoracicus, Cress. Proc. Ent. Soc. Phil. iii, p. 288, ♂.
Phygadeuon impressus, Prov. Nat. Can. vi, p. 281, ♀.
var. *Ichneumon erythopygus*, Prov. Nat. Can. vii, p. 79, ♂.

Hab.—Can., N. H., N. Y., Pa. Ferruginous; head, antennæ, pro- and mesothorax, sometimes the scutellum and pleura, tips of posterior femora and of their tibiæ, and apex of abdomen, black; annulus on antennæ, sometimes line on each side of face ♂, and spots or lines on apex of abdomen, white; wings slightly dusky; the mesothorax is varied with ferruginous and the basal segment is broader and more rugose in *erythopygus;* the sculpturing of the basal segment of abdomen in a good series of specimens, however, varies considerably, as does also the coloration of the thorax. Length ♂ ♀ .30—.35 inch.

9. **4-carinatus.**

Phygadeuon 4-carinatus, Prov. Nat. Can. vii, p. 180, ♂.

Hab.—Canada. A small ferruginous species, with head, antennæ, prothorax, three marks on mesothorax, sutures of thorax and beneath, and trochanters, black; sides of face, two spots on clypeus and annulus on antennæ white; wings strongly iridescent; base of abdomen coarsely rugose, the postpetiole having four strongly elevated carinæ. Length ♂ .25 inch.

10. **californicus**, Cress. Proc. Cal. Acad. Nat. Sci. 1877.

Hab.—California. Ferruginous, shining, especially the abdomen; mesothorax sometimes stained with blackish; antennæ very slender, apical half black, wings hyaline. Length ♀ .35 inch.

11. **lineolatus.**

Ichneumon lineolatus, Prov. Nat. Can. vii, p. 82, ♀.
Phygadeuon rufipes, Prov. Nat. Can. vii, p. 181, ♀.

Hab.—Canada. Very much like the preceding, but distinguished at once by the white annulus beyond middle of flagellum. Length ♀ .35 inch.

EURYLABUS, Wesm.

agilis, n. sp.

♀.—Black; dot on each side of vertex, annulus on flagellum, dot beneath tegulæ, scutellum and postscutellum, white; wings hyaline; four anterior tibiæ and tarsi more or less pale. Length .32 inch.

♂.—More slender; sides of face, two spots on clypeus, labrum, palpi, spot on scape beneath, spot on tegulæ and line before, white; extreme base of femora reddish; otherwise as in ♀. Length .35 inch.

Hab.—Can., Mass., N. Y.

Ichneumones pneustici.

With the very limited amount of material before me belonging to this division, I have thought it best for the present to refer the species so far known to me to

PHÆOGENES, Wesm.

Black species..... 1.
Black and ferruginous species, (the head and thorax being black).
Abdomen black at apex.
Antennæ with pale annulus.....2—5.
Antennæ without pale annulus..... 6.
Abdomen ferruginous, first segment only black..... 7.
Abdomen entirely ferruginous..... 8.
Ferruginous species.
Head and apex of abdomen black..... 9.
Head ferruginous.
Abdomen black at apex.....10—12.
Abdomen entirely ferruginous.
Antennæ with pale annulus.....13—14.
Antennæ without pale annulus.....15—16.

1. ater, n. sp.

♀.—Deep black, shining; head large, transversely subquadrate, cheeks swollen, punctured; face short, transversely sculptured; clypeus short, broad, anterior margin broadly rounded; mandibles narrowed to tip which has two subequal teeth; antennæ short, with whitish annulus on flagellum; thorax finely, not closely punctured; scutellum large, flattened, broadly rounded behind; metathorax coarsely and confluently punctured, with well-defined elevated lines, posterior face oblique, longitudinally sulcate, transversely sculptured; wings narrow, hyaline, areolet five-angular; legs slender, four anterior knees, tibiæ and tarsi dull testaceous, coxæ simple; abdomen long, narrow, subfusiform, sparsely punctured, polished; postpetiole smooth, narrow; base of second segment longitudinally aciculated and with a broad rather shallow depression, deeper at sides. Length .40 inch.

Hab.—Missouri. (C. V. Riley).

2. hariolus.

Ichneumon hariolus, Cress. Trans. Am. Ent. Soc. i, p. 305, ♀.

Hab.—N. H., Mass. Black, shining; head not unusually large, cheeks swollen; broad anterior orbits, mandibles and sometimes the cheeks yellowish-ferruginous; clypeus transversely depressed before anterior margin which is broadly rounded; antennæ rather long and slender, brown at base, black at tips, a whitish annulus on flagellum; thorax finely and closely punctured; scutellum flattened, sparsely punctured; metathorax coarsely sculptured, with well-defined elevated lines, posterior face broadly excavated and transversely wrinkled; tegulæ whitish; wings subhyaline; legs ferruginous, subrobust, posterior

femora swollen, brownish, their coxæ beneath with a large subobtuse tooth at tip; abdomen subdepressed, fusiform, indistinctly punctured; second, third and fourth segments ferruginous, sometimes also apex of postpetiole; gastrocoeli very transverse, deep. Length ♀ .35 inch.

3. **hebrus.**

Ichneumon hebrus, Cress. Trans. Am. Ent. Soc. i, p. 305, ♂ ♀.
Phygadeuon insignis, Prov. Nat. Can. vii, p. 179.

Hab.—Can., N. Y., Ill. Same form as the preceding, but with larger head; black, with legs except tips of posterior femora and of their tibiæ, and the abdomen except three apical segments, ferruginous: flagellum with a broad whitish annulus, and three basal joints reddish; head and thorax closely and strongly punctured; wings faintly dusky; posterior coxæ with a short obtuse tooth beneath near tip; abdomen strongly punctured on second and third segments, postpetiole and apical segments smooth; gastrocoeli very transverse nearly meeting on disc; the ♂ is more slender, with longer antennæ, which are entirely black except white annulus on flagellum; the femora and posterior tibiæ are black. Length ♂ ♀ .36—.40 inch.

4. **Hebe.**

Ichneumon Hebe, Cress. Trans. Am. Ent. Soc. i, p. 306, ♀.

Hab.—Ct., N. Y., Ill. Much smaller than *hebrus* and more slender in form; black, shining; mandibles except tips, and base of flagellum yellowish; flagellum with a narrow whitish annulus; tegulæ whitish; legs except posterior knees and tips of their tarsi, and segments two to four of abdomen, yellowish-ferruginous; wings hyaline; legs subrobust, posterior coxæ beneath with a large acute tooth at tip; gastrocoeli very transverse. Length ♀ .23—.25 inch.

5. **decoloratus,** n. sp.

♀.—Black; face, clypeus, posterior orbits, antennæ at base and beneath, disc of mesothorax, spot on scutellum, sides of thorax, legs, and segments one to four of abdomen, ferruginous; a white annulus on flagellum; antennæ long and slender; head broad, cheeks swollen: metathorax obliquely truncate behind; wings subhyaline; legs slender, simple, posterior femora and tips of their tibiæ blackish; abdomen narrow, subfusiform, shining, impunctured, base of second segment broadly transversely depressed. Length .30 inch.

Hab.—White Mts., N. H. (Morrison).

6. **discus,** n. sp.

♂.—Slender, shining, black; face, clypeus, mandibles, scape beneath, sometimes a spot beneath eyes, and on tip of scutellum, tegulæ, four anterior coxæ, and trochanters, yellow; flagellum beneath pale testaceous; legs and abdomi-

nal segments two to four, ferruginous; base of posterior coxæ and spot on disc of abdominal segments two to four above, blackish; wings subhyaline; legs slender, simple; abdomen narrow, second segment transversely depressed at base. Length .30 inch.

Hab.—White Mts., N. H. (Morrison).

7. exiguus.

Ichneumon exiguus, Cress. Proc. Ent. Soc. Phil. iii, p. 182, ♀.

Hab.—Colorado. Very robust, black, shining; scape, mandibles, legs and abdomen except first segment, ferruginous; head subrotund, face short, subprotuberant; antennæ short, robust, with submoniliform joints, scape large, swollen; thorax polished, impunctured; metathorax deeply excavated behind, with well-defined elevated lines; wings hyaline; legs short and robust, coxæ simple, femora swollen; abdomen broadly fusiform, polished, impunctured, postpetiole broad, petiole unusually robust, gastrocoeli obsolete. Length ♀ .23 inch.

8. fungor.

Ichneumon fungor, Norton, Trans. Am. Ent. Soc. i, p. 306, ♂.

Hab.—Ct., N. Y., Pa., Del., Ill. Long, slender, black; clypeus, antennæ, legs and abdomen, pale ferruginous; mandibles and tegulæ yellow; head large, transversely subquadrate, strongly punctured, clypeus nearly as long as broad; thorax strongly punctured; wings subhyaline; legs slender, simple, posterior tibiæ and tarsi dusky; abdomen long, slender, subcylindrical, shining, postpetiole narrow, gastrocoeli obsolete. Length ♂ .35—.40 inch.

9. quadriceps.

Ichneumon quadriceps, Cress. Trans. Am. Ent. Soc. i, p. 312, ♂ ♀.

Hab.—Can., Ct. This is a very long narrow species with quadrate head, and short, robust legs; ferruginous, with head, posterior femora and tibiæ and two terminal segments of abdomen, black; antennæ short; wings narrow, subhyaline; abdomen much longer than head and thorax, narrow and cylindrical, gastrocoeli obsolete. Length .40 inch.

10. vincibilis.

Ichneumon vincibilis, Cress. Trans. Am. Ent. Soc. i, p. 312, ♀.

Hab.—Illinois. Form of *Hebe;* entirely ferruginous except three apical segments of abdomen which are black, the antennæ are sometimes more or less black above and at tips with a whitish annulus on flagellum; head large and broad; wings hyaline; legs slender and simple; gastrocoeli very transverse. Length ♀ .27 inch.

11. tuberculifrons.

Phygadeuon tuberculifrons, Prov. Nat. Can. vi, p. 284, ♂ ♀.

Hab.—Can., Mass., N. Y. Entirely ferruginous except tips of antennæ and apex of abdomen, which are more or less black; head unusually large, deeply emarginate behind, cheeks swollen; antennæ with short, robust joints, the basal joints ferruginous, a whitish annulus at about the middle; wings narrow, clouded with fuscous, stigma conspicuous; legs rather slender, simple; abdomen fusiform, gastrocoeli obsolete. Length .25—.30 inch.

This probably belongs to *Centeterus*, Wesm.

12. helvolus.

Ichneumon helvolus, Cress. Trans. Am. Ent. Soc. i, p. 312, ♀.

Hab.—Ct., Pa., Ill. Much like *vincibilis*, but with narrower abdomen; entirely ferruginous except tips of antennæ and extreme apex of abdomen which are black; antennæ thickened towards tips, pale at base and with a pale annulus at about the middle; wings hyaline; legs subrobust, posterior coxæ with a short stout tooth beneath; abdomen narrow subfusiform, transversely depressed at base of second segment. Length ♀ .30 inch.

13. lævigatus.

Ichneumon lævigatus, Cress. Proc. Ent. Soc. Phil. iii, p. 176, ♀.

Hab.—Colorado. A robust, ferruginous species, the flagellum only being black with a broad whitish annulus; metathorax with sharply defined elevated lines and deeply excavated behind; wings hyaline; legs subrobust, posterior coxæ with a small acute black tooth beneath; abdomen fusiform, polished, gastrocoeli very transverse and deep. Length ♀ .33 inch.

14. mellinus.

Phygadeuon mellinus, Prov. Nat. Can. vii, p. 315, ♀.

Hab.—Can., Mass. Same form as *vincibilis;* shining ferruginous; flagellum black with broad white annulus; mandibles, palpi, tegulæ and trochanters white; sutures of thorax black; metathorax truncate behind, with well defined elevated lines; wings hyaline, iridescent; legs slender, with subrobust femora, posterior coxæ with small obtuse tooth beneath; abdomen fusiform, postpetiole broad, gastrocoeli very transverse and deep. Length ♀ .25—.28 inch.

15. helvus.

Ichneumon helvus, Cress. Trans. Am. Ent. Soc. i, p. 312, ♀.

Phygadeuon hilaris, Prov. Nat. Can. vi, p. 284, ♂.

Hab.—Can., Mass., Ct., Pa., Ill. Much the same form as *tuberculifrons;* ferruginous, shining; head large, subquadrate; mandibles large, broad, black, lower edge sinuate; antennæ short, with apex black; head and thorax closely and strongly punctured; wings subhyaline; legs slender, simple; abdomen fusiform, shining, impunctured, gastrocoeli obsolete. Length ♀ .30—.40 inch.

This probably belongs to *Colpognathus*, Wesm.

16. pyriformis.

Ischnus pyriformis, Prov. Nat. Can. vii, p. 109.

Hab.—Can., N. Y. Same form as *fungor*, but with smaller head; pale ferruginous; face, clypeus, mandibles, anterior orbits, scape beneath, line on collar, tegulæ, line before, and one beneath, scutellum, and four anterior coxæ and trochanters white or yellowish; large spot on vertex covering ocelli and extending to base of antennæ, tips of mandibles, antennæ above and sutures of thorax, black; inferior tooth of mandibles very short; wings hyaline; legs slender, simple; abdomen slender, cylindrical, shining, gastrocoeli obsolete. Length ♂ .35 inch.

Probably referable to *Herpestomus*, Wesm.

DESIDERATA.

Ichneumon nigratorius, Fabr. Syst. Piez. p. 55.—Scutello albo, thorace immaculato, corpore atro; orbita oculorum albicante. Magnitudo I. pisorii. Corpus totum atrum, nitidum antennarum fascia, oculorum orbita scutelloque albis. Habitat in America boreali.

Brullé, Hym. iv, p. 305, gives the following description of this species:

♀.—Il est noir, avec un anneau aux antennes et une tache sur l'écusson, jaunes. Les ailes sont transparentes, légèrement jaunâtres, avec les nervures, et le stigma surtout, d'un jaune roux. Le thorax est ponctué; l'écusson l'est peu ou point; le métathorax est fortement rugueux et comme ridé en travers, avec des lignes saillantes qui se croisent diversement; le trois premiers segments de l'abdomen sont couverts de points très-serrés et sont même finement striés au milieu; les autres segments sont à peine ponctués. Longueur; 0,018. Hab. la Caroline.

We have several species that answer tolerably well to the above descriptions, but all are too small—not over .60 inch. *I. pisorius*—an European species, with which *nigratorius* is compared for size, is very large, being from .80—1 inch in length.

Ichneumon Lariæ, Curtis, Ross, 2d Voy. Appendix, p. lxi, pl. A, fig. 1.—Antennæ curled; rufous, tips of antennæ, head, underside of the trunk, with the coxæ, and a spot and a broad stripe on the abdomen black. Clothed with very short brownish pubescence, pale castaneous, minutely punctured; antennæ and head black, the former filiform, the basal joint rufous, third and four following joints paler red; trunk black, the upper surface of the mesothorax and scutellum rufous and shining, metathorax dull and darker above, with a black furcate stripe down the back; abdomen ovate, very thickly punctured, a black dot at the base of the second segment, the third with a broad black stripe down the middle, concave on each side, the remainder black with a rufous stripe on each side at the base of the fourth segment, petiole rather short, narrowed at the base; wings tinged with yellowish-fuscous, nervures and stigma ferruginous ochre, areolet quinquangular; legs rather stout, coxæ and trochanters black, the former with a red spot on the upper side in the hinder pair. Length 5 lines.

This Ichneumon infested the larvæ of the *Laria Rossii*, from which it was bred early in July, another was taken on the 8th of the same month, but they were not very numerous.

Hab.—Arctic America. Quite distinct from anything known to me.

Ichneumon vinctus, Say, Contrib. Macl. Lyc. i, p. 70, ♂.—Body black; head above the antennæ and occiput, black; orbital line interrupted behind, and all beneath the antennæ except the incisure, white; antennæ, basal joints beneath, white; collar with a white line; thorax with a short line above the anterior wing and another below it, from the anterior extremity of these lines, a white line proceeds, and is interrupted before; two impressed dorsal lines obsolete behind; scutel and obsolete point behind it, white; wings, central cellule pentangular, transverse; metathorax with somewhat elevated rugæ, enclosing a pentangular space, from the angles of which abbreviated lines diverge, the two posterior of which terminate at the short tubercles; feet, anterior and intermediate pairs, pale whitish-yellow, the coxæ white with a black spot behind, the thighs with a black line and tibiæ of the anterior pair also with a black line; posterior pair black, second, third and fourth joints of the tarsi, white; abdomen bright rufous, immaculate. Length .50 inch.

Hab.—Indiana. Closely allied in some respects to *duplicatus*, Say, page 180, No. 171.

Ichneumon ferrugator, Kirby, Faun. Bor-Am. iv, p. 258.—Black, rather glossy, very thickly punctured with minute and often confluent punctures. Head transverse, triangular, not quite so wide as the middle of the trunk; anterior margin of the face rounded; palpi reddish; eyes long, subelliptical; antennæ shorter than the trunk, spirally convoluted; trunk oblong, subcompressed; scutellum subtriangular, rounded at the apex; metathorax armed on each side with a short tooth, with several elevated longitudinal and oblique lines; legs with decumbent whitish hairs, anterior tibiæ obscurely, and all the tarsi, rufous; wings embrowned with a rufous tint, nervures darker; abdomen lineari-lanceolate, rufo-ferruginous, with the first joint, which is dilated at the apex, black; footstalk channeled longitudinally on each side. Length 7 lines.

Hab.—Arctic America. Probably the same as *rufiventris*, Brullé, page 173, No. 137.

Ichneumon ferrugator, Fabr. Ent. Syst. ii, p. 154.—Ferrugineus antennis apice nigris. Medius, totus ferrugineus, mox immaculatus, mox pectoris lateribus nigris. Antennæ basi ferrugineæ, apice nigræ. Habitat ad Americes littora.

Brullé, Hym. iv, p. 295, refers this species to *Joppa*, and describes it as follows:

♂ ♀.—Il est d'un roux ferrugineux, avec les antennes rousses à la base, puis brunes, puis rousses encore, et enfin brunes à l'extrémité; dans la femelle, il existe un large anneau jaunâtre avant l'extrémité. L'abdomen est brun sur les cotés et un peu sur le bord de quelques segments. Les ailes sont d'un brun fuligineux, et quelquefois un peu violacé, avec l'origine du stigma jaunâtre. Les cuisses postérieures sont quelquefois brunes. La surface du corps est fortement ponctuée; celle du métathorax est un peu ruguense et surmontée de plusieurs lignes élevées, les unes longitudinales, les autres transversales: elle présente en outre, en arrière, une dépression plus on moins marquée. Longuerer: 0,015. Hab. la Caroline; Philadelphie.

This may be the same as *Ichn. trogiformis*, Cress. p. 175, No. 149.

Ichneumon pectoralis, Say, Contrib. Macl. Lyc. i, p. 72.—Body black; orbits and all beneath the antennæ, yellow; antennæ blackish, joints thirteen to sixteen white; thorax with scutel and a white line before the wings, interrupted before; transverse line beneath it, yellow; wings hyaline, central cellule pentangular, transverse; pleura black; pectus black, with a large yellow spot between the intermediate and posterior feet; feet yellow, posterior thighs tinged with rufous, posterior tibiæ rufous at tip; abdomen rufous with black incisures. Length over .20 inch.

Hab.—Indiana. This seems near to *scitulus*, Cress., page 180, No. 175.

Ichneumon astutus, Holmgren, Eugenies Resa Omkring Jorden, Insecta, p. 394.—Rufus; capite thoraceque ex parte flavis; antennis supra thoracisque maculis nigricantibus; alis leviter infumatis; coxis anterioribus pallidis. Long. 8 mm.

Patria: California.

Caput obsolete punctatum, pone oculos vix angustatum, antice visum subrotundatum; facie transversa, remote at distinctius punctata, infra antennas paullo elevata. Clypeus depressiusculus, apice truncatus. Labrum nonnihil exsertum. Mandibulæ dentibus longitudine inæqualibus. Antennæ validiusculæ, dimidio corpore longiores, apicem versus sensim paullo angustatæ. Thorax nitidulus, capite angustior; mesothorace subremote et parum manifeste punctato, antice lineis 2 impressis; pleuris magis nitidis et remotius punctatis; metathorace subtiliter ruguloso, areis superioribus 5, quarum superomedia transversa, posteromedia nonnihil concava, tridivisa, spiraculis linearibus. Abdomen angustum; segmenti primi postpetiolo vix nisi valde obsolete punctato, utrinque depresso, lateribus subparallelis; 2:do latitudine longiore, basin versus sensim angustato, subtiliter et confertim punctato, gastrocoelis manifestis; 3:tio transverso; ultimo ventrali subacuminato.

Mas. Caput rufum, ore, clypeo et facie pallide flavis. Antennæ nigricantes subtus testaceæ vel ferrugineæ. Thorax rufus, suturis lateralibus et pectore flavo-stramineis; macula prothoracis maculisque utrinque juxta scutellum nigris. Abdomen rufum. Alæ infumato-hyalinæ, stigmate fusco, radice et

squamulis testaceis. Pedes rufi, anteriorum coxis et trochanteribus stramineis, posticorum tarsis leviter infuscatis.

This is somewhat allied to *scibilis*, Cress. page 183, No. 191.

Ichneumon pennator, Fabr. Ent. Syst. ii, p. 155.—Luteus antennis alisque atris. Magnus. Antennae porrectae, atrae. Caput flavum punctis tribus verticalibus, elevatis, globosis, nitidis. Corpus totum flavum abdominis segmentis valde incisis, distinctis. Alae atrae, immaculatae. Pedes flavi. Habitat in Georgia Americae.

This is probably the same as *Trogus exesorius*, Brullé, page 196, No. 5, the color of which, however, is fulvo-ferruginous.

Ichneumon bifasciatus, Say, Contrib. Macl. Lyc. i, p. 72.—Body ferruginous; antennæ somewhat tinged with whitish beyond the middle and fuscous at tip; thorax circumscribing incisure black; wings dusky with a hyaline band hardly beyond the middle and an abbreviated one near the tip; stigma pale ferruginous; inferior wings dusky, semifasciate on the middle with hyaline; oviduct black; pectus incisures black; posterior tibiæ blackish at tip. Length .40 inch.

Hab.—Indiana. This is probably a species of *Cryptus*.

Joppa maurator, Brullé, Hym. iv, p. 287.—*Nigra, abdomine et femoribus posterioribus 2 ferrugineis, antennarum annulo albo, alis fuscis.* Mas. Fem. Il est noir, avec l'orbite des yeux plus ou moins jaune en avant, un anneau jaunâtre aux antennes (en dessus seulement dans la femelle) et le devant des pattes antérieures d'un jaune roux; les cuisses postérieures et l'abdomen sont d'un roux ferrugineux; les ailes sont enfumées, avec un reflet brilliant et comme métallique. Le thorax et les hanches de derrière sont granuleux ou chagrinés; le métathorax offre en outre plusieurs lignes saillantes et arquées; l'abdomen est chagriné, avec deux depressions à la base du deuxième segment. Longuerer. 0,018. Hab. la Caroline; Philadelphie.

This is probably the same as *Ichn. insolens*, Cress., page 174, No. 141, which, however, is not a *Joppa*.

Ichneumon hilaris, Say, Contrib. Macl. Lyc. i, p. 71, is not an *Ichneumon*, and probably belongs to the Pimplariæ.

Ichneumon Blakei, Cress., Proc. Ent. Soc. Phil. iii, p. 139, is a *Cryptus*.

Ischnus contiguus, Cress. Proc. Ent. Soc. Phil. iii, p. 190; *iridescens*, Cress. id. p. 193, and *albitarsis*, Cress. id. p. 194, also belong to *Cryptus*.

Ichneumon inquisitor and *pterelas*, Say, Contrib. Macl. Lyc. i, p. 71, belong to *Pimpla*.

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mellinus.....
pyriformis.....
quadriceps.....
tuberculatus.....
vincibilis.....

On certain genera of Staphylinidæ OXYTELINI, PIESTIDÆ, and MICROPEPLIDÆ, as represented in the fauna of the United States.

BY JOHN L. LECONTE, M. D.

OXYTELINI.

Having had recent occasion to arrange the species of *Bledius* in my collection, I perceived the necessity of grouping them in a natural manner in order to exhibit more clearly the relations between allied species in different parts of the country. As many of them are found only in the immediate neighborhood of the ocean-shore, or on contiguous salt marsh, it is evident, that if allied species occur inland at remote distances, they indicate the former presence of ocean water in those regions, and the divergence between the two forms will enable us to get some idea of the rapidity of change of structure in these instances, from the time when their homogeneous ancestors were separated and exposed to different influences by the progress of geological changes.

I would take occasion here to confirm the excellent remarks of Dr. David Sharp on the great value of sexual characters for the separation of nearly allied species in many of the genera of Staphylinidæ. I know in fact, of no other family of Coleoptera, in which forms at first sight almost undistinguishable may by the study of these characters, be most readily recognized.

Concerning these secondary sexual characters, which in the Oxytelini affect partly the head, partly the last two or three ventral segments, I have two observations to make:

1st. That in each group containing several species allied together by great natural resemblances, there will be found a gradation from those in which sexual characters are strongly expressed, to those in which they become trifling, or imperceptible.

2d. That where the sexual differences are strongly expressed at one extremity of the body, there is a diminution of the differences at the other end; thus indicating a polar action of the organizing influence, of such kind that when it manifests itself in one region of the body, it is correspondingly diminished at the other. This is not of the nature of correlation of growth, as ordinarily exhibited, by which an organ grows by appropriation of the material which would otherwise be divided between it and neighboring organs, but is more akin to

that localization of power, which is so frequently mentioned by Prof. Dana in his works on Cephalization.

Renewed examination of *Distemmus Argus*, shows it to be an Omalium, nearly related to the European *O. planum*. The first four joints of the tarsi are so short and closely united as to appear like two joints as in *Trogophlœus*, and the four together are barely one-third as long as the last joint. It therefore corresponds with *Phlœostiba* Thomson. Without having studied the tribe Omalini closely, I am inclined to think the narrow, depressed form, and the peculiar sculpture, which consists of anastomosing lines forming narrow meshes, would warrant the retention of this group of species as a distinct genus.

OXYPORUS Grav.

The following table will enable our species to be easily recognized. I have two new species to add to those mentioned and tabulated by Fauvel,* and only a few references to descriptions which are not cited in the Munich Catalogue.

Elytra with the sides finely rugose.....2.
Elytra polished, with the usual striæ and punctures.....3.
2.—Black, tibiæ and tarsi pale; elytra pale, suture and sides black.
1. **femoralis.**
Yellow, head, last two abdominal segments, and great part of elytra black.
2. **elegans**, n. sp.
3.—Legs black.....4.
Legs yellow.....6.
4.—Sides of prothorax much rounded.....5.
Sides of prothorax feebly rounded, elytra pale, with suture, sides and narrow vitta black.....3. **major.**
5.—Elytra bright reddish-yellow, outer apical angle black.....4. **rufipennis.**
Elytra black.....5. **stygicus.**
6.—Hind angles of prothorax, as usual, not flattened.....7.
Hind angles of prothorax flattened, rounded, concave beneath; rufous, head, two spots of prothorax, part of elytra, three last abdominal segments, and sides of metathorax black.....11. **quinquemaculatus.**
7.—Elytra longer and wider than prothorax.....8.
Elytra scarcely longer than prothorax; rufous, head, part of elytra, and tip of abdomen above and beneath black.....10. **lepidus**, n. sp.
8.—Color variable, elytra pale with sides and suture black.....6. **vittatus.**
Black above, pale yellow beneath.....7. **bicolor.**
Rufous, sides of elytra fuscous.....8. **lateralis.**
Rufous; spot of head, two of prothorax and part of dorsal surface of abdomen black; elytra black, each with a triangular rufous spot.
9. **occipitalis.**

* Marseul, Abeille, i, 369, (1864).

2. **O. elegans,** n. sp.—Bright reddish yellow, head black; antennæ and palpi testaceous. Prothorax narrower behind, rounded on the sides. Elytra scarcely longer than the prothorax, with the sides finely rugose from near the middle to the tip; the pair of punctured striæ well impressed, and the inner one somewhat confused; the color is black, with the entire base, and a stripe extending from the base nearly to the tip bright yellow. Abdomen yellow, with the last two dorsal and ventral segments black. Length 8 mm; .32 inch.

Louisiana, Mr. A. Sallé.

4. **O. rufipennis,** Lec. New Spec. Col. (Smithsonian 8vo).

This is perhaps only a color variation of the entirely black *O. stygicus*, Say, but as yet I have seen no intermediate specimens. There is no difference in form or sculpture.

7. **O. bicolor,** Fauvel, Abeille, i, 371.

North Carolina; easily recognized by the black head prothorax and elytra, piceous dorsal segments paler at the sides, and the yellow under surface, palpi and legs. The antennæ are testaceous. This species resembles *O. vittatus* in form and sculpture, but the inner of the approximate elytral striæ is more confused, though the specimens do not accurately agree in this respect in either of the species.

In one specimen the head is larger and the sides of the prothorax less rounded; in another there is a faint brown elytral vitta. Possibly it is only a color variation of *O. vittatus*.

10. **O. lepidus,** n. sp.—Elongate, bright rufo-testaceous, head black, occiput with a small brown spot. Prothorax narrowed behind, rounded on the sides. Elytra a little longer than the prothorax, very little wider; the pair of striæ well impressed; suture and lateral triangular spot blackish. Last two dorsal and ventral segments black, except the base of the penultimate which is rufous. Side pieces of metasternum black, base rufous. Length 7 mm; .28 inch.

New York, one specimen given me by Mr. Ulke; resembles in appearance *O. elegans*, but easily known by the outer apical part of the elytra being smooth, and by the penultimate ventral and dorsal segment being rufous at base.

OSORIUS Latr.

1. **O. politus,** n. sp.—Cylindrical, black, head, prothorax and elytra polished, sparsely not coarsely punctured. Abdomen rather densely and rugosely punctured. Epistoma broadly emarginate in the arc of a circle, angles prominent acute. Legs blackish-brown. Gula deeply longitudinally impressed. Length 8.5 mm; .33 inch.

Hilsboro, Florida; one specimen. Messrs. Hubbard and Schwarz.

2. **O. planifrons,** n. sp.—Cylindrical, black, shining, antennæ and legs reddish-brown. Head sparsely and finely punctured, very finely granulate, antennal tubercles and transverse occipital space smooth and polished; epistoma flattened, truncate, front angles minute, scarcely prominent. Prothorax

polished, sparsely, rather coarsely punctured with a wide dorsal smooth stripe. Elytra polished, sparsely and coarsely but not deeply punctured. Abdomen granulate, punctured. Gula narrowly but deeply channeled. Length 7 mm; .28 inch.

Southern States; two specimens. This species differs from *O. latipes* not only by the larger size, but by the much finer and sparser punctures of the head; and less numerous punctures of the prothorax and elytra; the front part of the head is also flattened and obliquely declivous, while in *O. latipes* it is feebly but regularly convex.

3. **O. latipes,** Er., Staph. 757; *Oxytelus lat.* Grav. Mon. 198; Oliv. Enc. Méth., viii, 816; *Molosoma lat.* Say, Tr. Am. Phil. Soc. iv, 462; ed. Lec. ii, 577.

Middle and Southern States, Kansas. Length 4 or 5 mm; .15—.20 inch. The smaller form was collected in Florida, by Messrs. Hubbard and Schwarz, and very frequently has red elytra.

HOLOTROCHUS Er.

1. **H. minor,** Fauvel, Ann. Ent. Soc. France, 1863, 437.

Three specimens from Florida, (Hubbard and Schwarz), one from South Carolina agree so closely with the description of this species that I am not warranted in considering them as distinct. The front tibiæ are not absolutely free from spines, but with a high power a row of fine distant slender spines may be seen, of which the largest is at the outer apical angle. Length 2.75 mm; .11 inch.

Dr. Sharp* has shown very beautifully the relations between this genus and *Lispinus* of the Piestini, from which it differs by the prominent and contiguous front coxæ.

I observe in addition, that in all Piestini the submentum is much larger and flatter, and defined behind by an angulated suture, while in *Osorius* and *Holotrochus* the transverse suture is nearly straight. By this character, *Ancæus* is shown to belong to the Piestini, though the front coxæ are contiguous and a little prominent. The form of this suture, however ceases to be even of generic value in *Bledius*, as will be seen below.

2. **H. lævicauda,** *Lispinus lævic.* Lec., New Spec. Col.

Illinois, New Mexico, Louisiana. This species is very closely allied to the preceding, but the elytra are nearly one-half longer than the prothorax, less deeply punctured; the dorsal segments are scarcely perceptibly punctulate. The antennæ are longer and less thickened towards the tip.

* Trans. Ent. Soc. London, 1876, 387.

BLEDIUS Leach.

The species of this genus may be naturally divided into several groups, which have been already in part recognized by Schiödte,* and described by him as distinct genera. The characters upon which these groups are defined have been determined by the study of very limited material, and will by no means serve for the natural arrangement of our species. The first dichotomous character of Schiödte:

I.—Terminal part of mandibles thick, with a strong sharp tooth behind the apex, etc.

II.—Terminal part of mandibles attenuated.

Would divide our large testaceous species which seem so closely allied as to be distinguished only by mandibular and abdominal characters, into two widely separated groups. The other characters used by that excellent observer are also of difficult observation, or visible with certainty only on dissection. I have therefore rejected them in great part and propose instead the following; the groups are named after the best known species pertaining to each.

Prothorax with lateral edge well defined.....2.
Prothorax without lateral edge or prosternal sutures.....1. **MANDIBULARIS.**
2.—Prosternal sutures obliterated; fissures of front coxal cavities short, closed..3.
Prosternal sutures distinct.....4.
3.—Hind angles of prothorax wanting.....II. **ARMATUS.**
Hind angles of prothorax obtuse.....V. **CORDATUS.**
4.—Fissure of front coxal cavities short, closed.....III. **SEMIFERRUGINEUS.**
Fissure of front coxal cavities long, open.....IV. **ANNULARIS.**

Group. 1.—*mandibularis.*

The species of this group are of large or moderate size, brownish-testaceous, not shining, finely granulate, and not strongly punctured; the head is usually darker with a short impressed line at the vertex, and an elevation at the base of the antennæ; epistome truncate at tip, sometimes with a subapical tubercle, the mandibles are very long, the apical part in some long and slender, in others compressed, and rather suddenly narrowed near the tip; about the middle there is a large ascending tooth; the labrum is broadly emarginate. Prothorax broader than long, truncate in front, sides parallel, suddenly and strongly narrowed from the middle to the base, which is narrow, truncate and finely margined; hind angles wanting; disc convex, with a well-marked dorsal line; lateral edge indistinct; under surface convex, prosternal sutures not visible, external fissure of front coxal cavities

* Naturhist. Tidsskrift, 3d ser., iv, 171, (1866); Ann. Mag. Nat. Hist. 1867, 3d ser., xx, 31.

closed or open according to position of coxæ. Front and middle tibiæ triangular, with widely separated rows of long spines; hind tibiæ slender, fimbriate with a few very long hairs, and sparsely spinose. The abdominal segments are very finely alutaceous, not punctured above, finely and sparsely punctulate below.

The species of this group resemble each other very closely and might be readily confounded, if it were not for the differences in the gular process (submentum), and the sexual characters. In the neighborhood of the ocean they live in salt marshes, and their occurrence on both sides of the continent, with a closely allied form in the interior, indicates an origin and distribution similar to that of species of various genera already mentioned by me. I have interpreted such cases to be unmodified, or (in this instance), slightly modified survivals of ancient forms and probably from the cretaceous period.

Submental transverse suture, angulated at the middle.....2.
Submental transverse suture, straight.....3.
2.—Gula with a very deep triangular excavation.....1. **gularis**, n. sp.
Gula with a shallow excavation.....2. **pallipennis.**
3.—Submentum excavated;
Excavation deep, divided by a prominent ridge.....3. **fortis**, n. sp.
Excavation wider, divided by a broad, flat elevation.
4. **mandibularis.**
Excavation wider, flat at the bottom.....5. **brevidens**, n. sp.
Excavation shallow, divided by a narrow median elevation.
6. **ferratus**, n. sp.
Excavation small, shallow.....7. **jacobinus**, n. sp.

1. **B. gularis.**—Yellow-brown, not shining; head, mandibles, suture, diagonal tip of elytra, and last two abdominal segments blackish; apical part of mandibles slender, tooth very long; epistoma with a prominent subapical tubercle, or short horn, which is emarginate at tip; occiput with a deep transverse short impression, which is met by the short deep impressed line of the vertex; supra-antennal ridges prominent; submental suture angulated; submentum flat, strongly declivous; gula with a very deep triangular excavation. Length 7.5 mm; .30 inch.

♂.—Seventh ventral segment slightly sinuous at tip, eighth with two impressed lines converging in front, intermediate space corneous; ♀, eighth segment feebly impressed.

One ♂, Middle States; precise locality unknown; ♀, Illinois; Dr. Horn.

The sculpture is exactly as in *B. mandibularis*, from which it differs only by the punctures of the prothorax and back part of the head being stronger, and by the characters above mentioned.

2. **B. pallipennis**, Er. Staph., 779; *Oxytelus pall.*, Say, Journ. Ac. Nat. Sc. iii, 155; ed. Lec. ii, 100.—Yellow-brown, not shining; head and mandibles blackish, suture and tip of elytra fuscous; apical part of mandibles slender,

tooth very long; epistoma slightly elevated near the tip, with two small distant cuspe, supra-antennal ridges prominent; vertex convex at the middle, with a short deep impressed line, transverse impression of the occiput obsolete; submental suture angulated; submentum slightly declivous, with a granulated space at the middle; gula with a shallow but sharply defined triangular impression. Length 9 mm; .35 inch.

♂.—Seventh ventral segment slightly sinuous at tip; eighth with two converging lines, which soon become parallel; intermediate space corneous; ♀, eighth ventral very feebly impressed.

One ♂, Nebraska; collected by Dr. F. V. Hayden; ♀, Illinois; Dr. Horn. The head and prothorax are punctured as in *B. gularis*, that is, more strongly than in *B. mandibularis*.

3. **B. fortis,** n. sp.—Blackish-brown, not shining, elytra reddish-brown; mandibles long and stout, apical portion broad, compressed, obliquely and strongly narrowed towards the tip; tooth broad and strong; epistoma truncate slightly convex, with a few small punctures each side; supra-antennal ridges strongly elevated; vertex feebly transversely concave, impressed line longer than in the other species, punctures very sparse and small. Prothorax sparsely finely punctured, dorsal line deep. Submental suture straight; submentum with a very deep excavation, which is almost divided by a narrow elevated ridge. Length 10 mm; .40 inch.

♂.—Seventh ventral segment slightly sinuous at tip; eighth with a deep triangular incision, not closed by membrane.

♀.—Submentum less deeply impressed; eighth ventral not incised.

One ♂, Galveston, Texas; ♀, Dr. Horn. The tooth of the mandibles of the ♀ is shorter and less prominent, and the body less robust; the elevation in the cavity of the submentum is broader, almost as in *B. mandibularis* ♂.

4. **B. mandibularis,** Er. Staph. 765.—Yellow-brown, not shining; head and mandibles blackish; apical part of mandibles compressed, suddenly narrowed near the tip, tooth very long; epistoma flat, supra-antennal ridges moderate; vertex broadly concave, with a short longitudinal impressed line, sparsely obsoletely punctured behind; prothorax broader than long, sparsely irregularly and feebly punctured, dorsal line deep, entire; elytra finely not deeply punctulate, dusky along the suture; dorsal segments smooth, shining, tip sometimes darker; ventral segments sparsely punctulate; submental suture straight; submentum with a deep and broad excavation, the middle part of which is filled by a broad flat elevation. Length 7.5—10 mm; .30—.40 inch.

♂.—Seventh ventral segment slightly sinuate at tip; eighth with a deep acute triangular incision, the bottom of which is closed by membrane.

Abundant at New York, and other points on the Atlantic coast of the Middle States.

5. **B. brevidens,** n. sp.—This species is precisely similar in color and sculpture to *B. mandibularis*, but is less robust in form, and the tooth of the mandibles is short and oblique in both sexes. The cavity of the submentum is broad and flat, without any central elevation. Length 10 mm; .40 inch.

♂.—Eighth ventral segment with two distant slightly converging impressed lines; tip slightly emarginate, or rather, triangularly impressed.

New York, collections of Dr. Horn and myself. The differences are so obvious and the other characters so similar that a longer description is not needed. The tip of the abdomen is not darker in any of the specimens I have seen, nor is the suture dusky.

6. **B. ferratus,** n. sp.—Brown, not shining, antennæ, legs and elytra paler; mandibles with the apical part compressed, gradually narrowed from the tooth to the tip; tooth compressed, short, acute; epistoma slightly convex; frontal suture feebly angulated, with an obsolete cusp at the middle; supra-antennal ridges short, broad; back part of head rather strongly but sparsely punctured, line of vertex short. Prothorax rather strongly punctured, dorsal line deep. Elytra finely but more distinctly punctured than in the preceding four species, ventral segments more densely punctulate than in them; dorsal segments sparsely punctulate. Submentum excavated, with a small median elevation; submental suture straight, gula very deeply longitudinally impressed. Length 7.5 mm; .30 inch.

♂.—Eighth ventral segment with a deep narrow incision, closed by membrane. ♀.—Eighth segment rounded at tip.

San Diego, Cala.; three specimens, collected by Mr. G. R. Crotch; varies uniform yellowish-brown.

7. **B. jacobinus,** n. sp.—Brown, not shining, antennæ, legs and elytra paler; mandibles with the apical part compressed, gradually narrowed from the tooth to the tip; tooth not large, acute; head as in the preceding, except that the frontal suture is straight; prothorax strongly punctured, dorsal line entire. Elytra finely but more strongly punctured than in *B. ferratus;* dorsal and ventral segments as in that species; submentum with a small circular impression; submental suture straight, gula deeply impressed longitudinally. Length 4.8—7 mm; .19—.27 inch.

♂.—Seventh ventral segment broadly emarginate. ♀.—Seventh ventral truncate; eighth segment rounded in both sexes.

San Diego, Cala.; five specimens, Messrs. Crotch and Hardy.

Group 2.—*armatus.*

In this group the side margin of the prothorax is distinct, and the prosternal sutures are obliterated; the fissure of the anterior coxal cavities is always closed. The submentum is flat, never excavated, and the longitudinal gular line is well-impressed. The mandibles are stout, not very long, with one or two broad teeth on the inner side; the apical part is rather short and not slender. The front and middle tibiæ are compressed, fringed with long spines arranged in widely separated rows. The sides of the prothorax are nearly parallel for three-fourths the length, then strongly rounded to the base, without any hind angles. The sculpture of the prothorax is coarse, and the elytra are usually strongly punctured. The dorsal surface of the abdomen is nearly smooth, the ventral is densely but finely punctured.

So far as I know, these species are not found in salt marshes, but frequent the borders of streams and ponds.

Flanks of prothorax concave along the side margin.....2.
Flanks of prothorax convex.....8. **armatus.**
2.—Under surface of prothorax with an impressed line parallel with the margin .....3.
Under surface of prothorax without impressed line.....9. **cribricollis.**
3.—Elytra densely punctured.....10. **cuspidatus.**
Elytra sparsely punctured.....11. **politus.**
Elytra finely punctured; punctures and dorsal line of prothorax indistinct.....12. **flavipennis.**

8. **B. armatus,** Er. Staph. 779; *Oxytelus arm.*, Say, Journ. Ac. Nat. Sc. Phila. iii, 155; ed. Lec. ii, 100.—Dark chestnut-brown, sometimes blackish-brown, somewhat shining. Head finely granulate, with an impressed line from the frontal suture to the vertex. Antennæ with the sixth and seventh joints gradually larger. Mandibles with a strong tooth near the tip. Prothorax not wider than long, front angles rounded, sides parallel, then rounded into the base, without angles; disc coarsely and sparsely punctured, very finely granulate, dorsal line deep. Elytra convex, usually less dark, rather shining, deeply rather densely punctured, sutural angle rounded. Dorsal segments feebly and sparsely punctulate; ventral segments finely rather densely punctured. Side margin of prothorax fine, but distinct, flanks not concave. Length 5—7.5 mm; .20—.25 inch.

♂.—Supra-antennal ridges strong and acute; anterior angles of epistoma elevated into acute cusps; vertex with a tubercle which is divided by the longitudinal line.

♀.—Supra-antennal ridges broader and smaller; epistomal cusps obsolete; vertical tubercle very feeble. There are no differences in the last ventral segments.

Kansas, Arizona, Nevada, California. The specimens collected by Say were evidently immature, since he describes the species as pale reddish-brown with black head.

9. **B. cribricollis,** n. sp.—Brown or blackish-brown, rather shining, antennæ ferruginous. Head scarcely perceptibly granulate, impressed line extending from the frontal suture to the vertex. Prothorax a little longer than wide, front angles rounded, sides parallel, then rounded into the base, without hind angles; surface nearly smooth, with deep coarse scattered punctures, dorsal line deep. Elytra densely and finely punctured. Dorsal segments nearly smooth, ventral finely and sparsely punctured. Margin of prothorax acute, flanks deeply concave beneath, without line parallel to the margin. Mandibles with a large tooth near the tip. Length 4 mm; .15 inch.

♂.—Epistoma with the anterior angles elevated into obtuse cusps; supra-antennal ridges acutely elevated; front convexly elevated near the epistoma, convexity divided by the longitudinal line.

♀.—Epistoma not cuspidate; supra-antennal ridges less elevated, frontal convexity not apparent, ventral segments alike in both sexes.

San Diego, California; three specimens collected by Mr. G. R. Crotch.

10. **B. cuspidatus,** n. sp.—Blackish-brown, prothorax red-brown, elytra, antennæ, palpi and legs yellow-brown. Head finely granulated, with a large puncture on the vertex. Prothorax more finely granulated, somewhat shining, convex, punctures rather large, scattered, dorsal line fine; scarcely as long as wide, front angles rounded, sides parallel, then rounded into the base, without hind angles. Elytra brownish-yellow, suture dusky, finely rather densely punctured, shining. Dorsal segments smooth, shining; ventral densely finely punctured. Margin of prothorax acute, flanks narrowly but deeply concave, with a very faint impressed line parallel with the margin. Mandibles bisinuate on the inner edge, indicating two broad, but feeble teeth. Length 5.5 mm; 2.2 inch.

♂.—Epistoma with the anterior angles elevated into acute cusps; supra-antennal ridges acutely elevated; a very small tubercle at the middle of the vertex; eighth ventral segment acutely triangularly incised, and with a fine impressed line.

♀.—Cusps of epistoma and supra-antennal ridges less developed; eighth ventral segment rounded at tip.

Dacota; one pair kindly given me by Mr. Ulke.

11. **B. politus,** Er. Staph. 766.—Shining, piceous, prothorax ferruginous, elytra, antennæ, palpi and legs brownish-yellow. Head finely granulate, opake, without any impression on the vertex. Prothorax not longer than wide, convex, polished, sparsely and coarsely punctured, dorsal line deep; sides parallel, rounded into the base, without hind angles. Elytra shining, coarsely and sparsely punctured. Dorsal segments smooth, ventral sparsely finely punctulate. Margin of prothorax acute, flanks narrowly but deeply concave, and with a distinct impressed line parallel to the margin; an impression also extends transversely from the fissure of the front coxal cavities to this line, but the fissure is not open, and the prosternal suture is not visible. Length 3.7 mm; .15 inch.

One female, Coney Island, near New York, July. Erichson's description agrees with this specimen except that the characters of the head indicate a male, with the epistomal cusps, elevated supra-antennal ridges, and small vertical tubercles.

12. **B. flavipennis,** Lec., New Spec. Col. (Smithsonian 8vo), 52.—Dark-brown, base of antennæ, elytra and legs yellow-brown; prothorax reddish-brown. Mandibles with two obtuse teeth on the inner edge. Head opake, finely granulate, with a short impression on the vertex. Prothorax not shining, not longer than wide, sides parallel, rounded behind into the base, as in the other members of this group, feebly and sparsely punctured, dorsal line indistinct. Elytra shining, finely but strongly punctured, suture dusky. Abdomen with the tip paler, dorsal segments nearly smooth, ventral punctured. Side margin of prothorax acute, flanks narrowly concave, with an indistinct line parallel to the margin. Length 4.2—5.3 mm; .17—.21 inch.

♂.—Front angles of the epistoma produced into slender erect horns, recurved at tip; supra-antennal ridges acutely and strongly elevated; vertex with a tubercle which is divided by the short impressed line.

♀.—Front angles of epistoma acute but not elevated; supra-antennal ridges and vertical tubercle less developed. The last ventral segments are alike in both sexes.

San Diego, California; twelve specimens.

Group 3.—*semiferrugineus.*

In the species of this group, which is the best represented in our fauna, the side margin of the prothorax is acute and the flanks concave; the fissure of the front coxal cavities is short and closed; the prosternal sutures run from the outer end of the fissure towards the anterior angles of the pronotum, so that the side pieces (episterna) are distinctly triangular. The mandibles are stout, strongly toothed near the tip, which is compressed and gradually narrowed. The rows of spines on the front tibiæ are widely separated; the hind tibiæ are long and slender, fimbriate with long sparse hairs and a few fine spines.

Prothoracic episterna very distinctly triangular, sutures directed to the front angles of the pronotum.....2.
Prothoracic episterna not triangular, sutures parallel with the side margin of the under surface of the prothorax.....6.
2.—Sides of prothorax very much rounded.....3.
Sides of prothorax slightly rounded, nearly parallel in front.....5.
3.—Head not or obsoletely punctured.....4.
Head coarsely punctured.....13. **semiferrugineus.**
4.—Prothorax wider than long, densely punctured...14. **rotundicollis,** n. sp.
Prothorax not wider than long, more coarsely punctured.....15. **fumatus.**
5.—Larger, head shining, sparsely punctured.....16. **nitidiceps,** n. sp.
Smaller, head opake, impunctured.....17. **opacifrons,** n. sp.
Testaceous, dorsal line of prothorax deep.....18. **rubiginosus.**
6.—Ferruginous, head and prothorax darker, tip of abdomen black; dorsal line of prothorax faint.....19. **analis.**
Blackish-brown, elytra, antennæ and legs brown; dorsal line of prothorax wanting.....20. **nitidicollis.**

13. **B. semiferrugineus,** Lec. New Sp. Col. (Smithsonian 8vo), 52.—Chestnut-brown, shining, elytra paler, legs yellow-brown. Head coarsely punctured, with a smooth space on the vertex, in the middle of which is a large deep puncture. Prothorax nearly globose, truncate in front, coarsely rather densely punctured, dorsal line deep. Elytra deeply and rather densely, but not coarsely punctured. Dorsal segments sparsely punctulate; ventral also sparsely punctulate. Side margin of prothorax fine but distinct, flanks convex, sutures of prosternum reaching the front angles of the pronotum; episterna smooth, triangular; prosternum opake, feebly punctured. Mandibles with a large tooth near the tip; apical part rather slender. Length 4.5 mm; .18 inch.

♂.—Sixth ventral segment broadly emarginate in an arc of a circle; eighth segment not incised nor impressed. ♀.—Sixth ventral truncate.

Middle States, Michigan, Florida.

14. **B. rotundicollis,** n. sp.—Chestnut-brown, tip of abdomen and legs brownish-yellow. Head opake, finely granulate, not punctured; vertex obsoletely foveate. Prothorax wider than long, rounded, truncate in front, deeply rather densely punctured, dorsal line distinct. Elytra densely and rather finely punctured. Dorsal segments sparsely punctulate; ventral finely rather densely

punctured. Side margin of prothorax fine, flanks convex, episterna triangular, subopake; prosternum feebly punctured. Length 7 mm; .27 inch.

♂.—Sixth ventral segment deeply emarginate in the arc of a circle; eighth acutely incised at tip; incisure closed by membrane.

One specimen; Fort Pierre, Nebraska.

15. **B. fumatus,** Lec. New Sp. Col. (Smithsonian 8vo), 52.—Chestnut-brown, shining, elytra red-brown; legs and usually the tip of the abdomen brownish-yellow. Head opake, finely granulate, obsoletely sparsely punctulate, with a small vertical puncture. Prothorax not wider than long, rounded, truncate in front, strongly punctured, dorsal line deep. Elytra strongly but less coarsely punctured. Dorsal segments sparsely punctulate, ventral segments finely punctured. Side margin and flanks of prothorax as in the preceding, but the episterna are less convex, and even slightly concave along the side margin. Length 5—6 mm; .20—.24 inch.

♂.—Sixth ventral segment broadly and obtusely emarginate; eighth not incised. ♀.—Sixth ventral truncate.

Illinois and Canada; four specimens.

16. **B. nitidiceps,** n. sp.—Black, shining, antennæ, legs and elytra red-brown. Head shining, sparsely punctured, vertex somewhat elevated, with a large puncture at the middle. Prothorax longer than wide, sides nearly straight for three-fourths the length, less suddenly rounded behind than usual, surface polished, punctures deep, scattered, not very coarse; dorsal line deep. Elytra strongly punctured. Dorsal segments finely punctured with longer and more numerous hairs than usual; ventrals finely punctured. Side margin of prothorax fine, episterna flat, triangular, slightly concave along the margin. Length 7 mm; .28 inch.

Los Angeles and Wilmington, Cala.; Mr. Crotch. No sexual differences observed.

17. **B. opacifrons,** n. sp.—Black, less shining; antennæ and legs brown. Head opake, finely granulate, impunctured, with a small fovea at the vertex. Prothorax with sides nearly parallel, then rounded into the base, sparsely punctured, finely granulate, dorsal line fine. Elytra coarsely not densely punctured. Dorsal segments feebly punctulate, ventrals finely punctured, tip brown. Side margin of prothorax acute, flanks concave along the margin; episterna triangular. Length 4 mm; .16 inch.

Los Angeles and San Diego, Cala.; Mr. Crotch. No sexual differences observed in three specimens examined.

18. **B. rubiginosus,** Er. Staph. 765.—Rufo-testaceous, somewhat shining. Head darker, sparsely and feebly punctured, almost imperceptibly granulate. Prothorax coarsely, rather densely punctured, dorsal line deep. Elytra deeply rather densely punctured. Dorsal segments sparsely punctulate; ventrals more distinctly finely punctured. Side margin of prothorax fine, episterna triangular, slightly concave along the margin. Mandibles compressed, toothed so as to form a right angle near the tip, which is not very slender. Length 5.2 mm; .21 inch.

South Carolina. No sexual differences seen in eight specimens examined.

19. **B. anxalis,** Lec. New Sp. Col. (Smithsonian 8vo), 52.—Ferruginous, rather shining, head, prothorax and last two dorsal segments blackish-brown; elytra with suture dusky. Head finely granulate, opake, sparsely not deeply punctured. Prothorax as wide as long, sides feebly rounded for three-fourths the length, then strongly rounded into the base; coarsely not sparsely punctured, dorsal line faint. Elytra deeply punctured. Dorsal segments nearly smooth, ventrals sparsely punctulate. Prosternal sutures nearly parallel with the side margin, which is slightly concave. Length 4 mm; .16 inch.

♂.—Seventh ventral segment with a small triangular apical impression, eighth broadly emarginate.

♀.—Seventh ventral segment sinuate at tip, slightly prominent at the middle, eighth triangularly impressed.

Illinois and Missouri.

20. **B. nitidicollis,** Lec. New Sp. Col. (Smithsonian 8vo), 52.—Dark-brown, antennæ, legs, elytra and tip of abdomen red-brown. Head finely granulated, sparsely punctured. Prothorax polished, coarsely not densely punctured, with a smooth dorsal narrow space, but no impressed line. Elytra strongly punctured. Dorsal segments slightly punctulate, ventrals finely sparsely punctured. Side margin of prothorax acute, flanks feebly concave along the side, episterna trapezoidal, sutures of prosternum slightly oblique. Length 3 mm; .12 inch.

New York, Michigan and Missouri; many specimens, without sexual difference. The hind angles of the thorax though very obtuse and rounded are perceptible, whereby this species differs from all the foregoing and establishes a transition to the next group. It resembles in fact *B. annularis*, but differs by the dorsal prothoracic line being absent; the coxal fissures shorter and not open, and the episterna of the prothorax wider and less concave.

Group 4.—*annularis.*

In the species of this group the side margin of the prothorax is acute, and the flanks more or less concave along the side; the fissure of the front coxal cavities is open and large, extending two-thirds way from the coxa to the side; the prosternal sutures are straight, and the episterna rather narrow and parallel. The mandibles have two acute teeth on the inner side, and the apical part is moderately long and slender. The hind angles of the prothorax are usually very obtuse and rounded, but somewhat apparent, which is not the case in the preceding groups; though in other species the sides are rounded into the base without any angles. The frontal suture is usually very fine and frequently indistinct, though I have not been able to use this character for specific distinction.

Head and prothorax finely granulate; the former flattened.....2.
Head and prothorax polished; the former convex; epistoma with a small apical tubercle; prothorax without hind angles.....12.

2.—Prothorax without hind angles.....3.
Prothorax with hind angles obtuse, distinct except in sp. 24, 27.....4.
3.—Prothorax and elytra very finely and densely punctulate.
21. **punctatissimus**, n. sp.
Prothorax sparsely, elytra strongly punctured.....22. **laticollis**, n. sp.
4.—Sides of prothorax rounded.....5.
Sides of prothorax subangulated, slightly sinuate; color entirely black, finely punctured.....23. **longipennis.**
5.—Elytra uniform in color, brown, blackish or testaceous; mentum frequently impressed.....6.
Elytra yellow and black, mentum quite flat.....9.
Testaceous yellow, head and tip of abdomen dark...35. **phytosinus**, n. sp.
6.—Flanks of prothorax distinctly concave.....7.
Flanks of prothorax nearly flat; elytra yellow, finely punctured: prothorax finely granulate, obsoletely punctured.....24. **luteipennis**, n. sp.
Flanks of prothorax flat in front, slightly concave about the middle; blackish-brown or brown, head and prothorax darker; the latter distinctly punctured, finely granulated, hind angles distinct, subrectangular.....25. **sinuatus**, n. sp.
7.—Prothorax very densely granulated, opake.....8.
Prothorax less densely granulated, subopake, hind angles distinct.
26. **annularis.**
8.—Hind angles of prothorax indistinct, rounded; elytra chestnut, strongly punctured.....27. **confusus**, n. sp.
Hind angles of prothorax very obtuse, but distinct; elytra yellow-brown, densely punctured.....28. **ruficornis.**
9.—Epipleuræ dark.....10.
Epipleuræ yellow.....11.
10.—Elytra diagonally divided in color.....29. **divisus.**
Elytra with base and wide sutural stripe black.....30. **pleuralis**, n. sp.
Elytra more finely punctured, diagonally divided in color.
31. **diagonalis.**
11.—Elytra more strongly punctured, yellow, base and suture black.
32. **tau**, n. sp.
Elytra more finely punctured, sides and apical quadrate spot yellow.
33. **ornatus.**
Elytra more strongly punctured, suture fuscous.....34. **suturalis.**
12.—Rufous, head, and sometimes the abdomen darker...36. **cognatus**, n. sp.
Piceous, antennæ, legs and elytra yellow-testaceous, suture dusky.
37. **emarginatus.**

21. **B. punctatissimus**, n. sp.—Black, finely pubescent, antennæ fuscous base ferruginous; legs ferruginous. Head opake, front broad flat, antennal ridges nearly obsolete. Prothorax wider than long, much rounded on the sides, hind angles rounded into the base, disc subopake, finely and very densely punctulate, dorsal line obsolete. Elytra less opake, finely and very densely punctulate. Dorsal segments shining, feebly punctulate; ventrals similarly punctulate. Mandibles with the apical part long and slender. Side margin of prothorax acute, flanks concave along the margin, episterna narrow, parallel; coxal fissures long, (open?). Length 3 mm; .11 inch.

One specimen, Southern California, collected by Mr. Hardy, and given me by Dr. David Sharp. Another specimen precisely similar

was given me by Mr. Ulke as coming from Florida. This locality is perhaps doubtful; if correct it indicates an example of very unusual distribution.

This species is quite distinct from any other in our fauna, and with larger material would be more properly placed as a distinct group.

22. **B. laticollis,** n. sp.—Blackish-brown, more robust than usual, base of antennæ, elytra and feet red-brown or yellowish. Head opake, finely granulated, indistinctly sparsely punctured, front wide and flat, antennal ridges short, but distinct as usual. Prothorax wider than long, much rounded on the sides, hind angles scarcely apparent; finely granulate, opake, sparsely not deeply punctured, with a narrow smooth dorsal stripe and a very indistinct dorsal line. Elytra rather densely and strongly punctured, sutural angle more rounded than usual; when pale colored the base is dusky. Dorsal segments very sparsely punctulate; ventrals strongly, but finely and not densely punctured. Mandibles with the tip long and slender. Side margin of prothorax acute, flanks concave along the margin, episterna narrow, parallel, coxal fissures open. Length 4 mm; .16 inch.

♂.—Front angles of epistoma slightly elevated; two small distant tubercles just behind the frontal suture. Ventral segments alike in both sexes.

San Diego and Los Angeles, Cala; found abundantly by Mr. G. R. Crotch. This species again breaks the homogeneous character of this group, and were it not for the open coxal fissures would be better associated at the end of the preceding group.

23. **B. longipennis,** Maeklin, Bull. Mosc. 1852, ii, 318.—Black, finely pubescent, tarsi brownish. Head opake, finely granulate, front wide, flat. Prothorax not wider than long, sides broadly rounded from the front angles for more than half the length, then subangulated, and feebly sinuate to the hind angles, which are nearly rectangular; disc opake, feebly punctulate, finely granulate, dorsal line very fine. Elytra rather longer than usual, a little wider than the prothorax, finely and densely punctured. Dorsal segments shining, sparsely punctulate; ventrals strongly and finely punctured. Side margin of prothorax acute, episterna parallel, concave along the side, coxal fissures open. Apical part of mandibles long and slender. Length 4.5 mm; .175 inch.

♂.—Eighth ventral segment with a small acute incision.

British Columbia, one specimen; previously described from Alaska.

24. **B. luteipennis,** n. sp.—Black, legs and elytra brownish-yellow, antennæ broken. Head and prothorax very finely granulated, subopake; the latter not wider than long, rounded at the sides, hind angles very obtuse, rounded and indistinct, punctures sparse, small and not deep, dorsal line deep. Elytra longer than usual, rather finely and densely punctured, suture dusky towards the base; apical angle more rounded than usual. Dorsal segments nearly smooth, anus brown; ventral segments dark-brown, strongly and finely punctured. Side margin of prothorax acute, episterna rather wide, nearly flat, sutures extending only to the coxal fissures, which are open. Mentum with a small deep impression near the hind margin. Length 3 mm; .12 inch.

One badly preserved specimen, San Bernardino, Cala.

25. **B. sinuatus,** n. sp.—Blackish-brown or brown, with head and prothorax darker; antennæ and legs ferruginous. Head subopake, distinctly granulate, sparsely punctured behind, with a small occipital fovea, and a short transverse line. Prothorax wider than long, rounded on the sides, which are subsinuate near the base, angles distinct, slightly prominent; disc subopake, granulated, sparsely distinctly punctured, dorsal line very fine, nearly obsolete. Elytra strongly punctured, convex, scarcely impressed. Dorsal segments sparsely punctulate, ventrals distinctly sparsely punctured. Flanks of prothorax slightly concave behind, nearly flat in front, episterna moderately wide, with an impressed line extending behind the coxal fissures which are large and open. Length 4 mm; .16 inch.

♂.—Eighth ventral segment with two distant impressed, slightly converging lines; mentum with a small rounded shallow impression, (body dark-brown). Canada.

♀.—Eighth ventral segment slightly impressed; mentum nearly flat; (body brown, head and prothorax darker). Illinois.

I have doubtfully associated these two specimens together, as they agree, except in color and in the impression of the mentum. Should they prove with larger material to be distinct, the female may be regarded as the type, and a new name imposed on the Canadian darker form.

26. **B. annularis,** Lec. New Sp. Col. (Smithsonian 8vo), 53.—Brownish-black, elytra and abdomen sometimes reddish-brown, the latter indistinctly fasciate; antennæ, mouth organs and legs ferruginous. Head finely granulated, sparsely punctured, with a small fovea at the vertex. Prothorax not wider than long, rounded on the sides, hind angles obtuse, distinct; disc finely granulated, subopake, sparsely not deeply punctured, dorsal line fine. Elytra deeply and densely punctured. Dorsal segments sparsely punctulate, ventrals finely sparsely punctured. Side margin of prothorax acute, episterna narrow, concave, prosternal sutures extending behind the coxal fissures, which are long and open. Mentum broadly but feebly concave behind. Length 3.3 mm; .13 inch.

♂.—Last (eighth), ventral segment deeply and acutely incised.

Lake Superior, Illinois, Missouri, Georgia, British Columbia and Vancouver's Island.

This and the next three species have an almost deceptive resemblance, but are to be distinguished by the characters of the upper and lower surface of the prothorax.

27. **B. confusus,** n. sp.—Brownish-black; elytra sometimes red-brown, antennæ piceous, base ferruginous, legs dark ferruginous. Head opake, less finely granulate, obsoletely sparsely punctured. Prothorax wider than long, more rounded on the sides, hind angles very obtuse and rounded; disc less finely granulated, opake, sparsely punctured, dorsal line fine. Elytra strongly rather densely punctured. Dorsal and ventral segments, and under surface of prothorax just as in *B. annularis.* Mouth ferruginous, mentum broadly concave. Length 3 mm; .12 inch.

♂.—Last ventral segment with a small acute incision which is closed by membrane.

Lake Superior, four specimens. Differs from *B. annularis* by the more strongly and densely granulated head and prothorax; the latter is wider and more rounded on the sides, with the hind angles rounded and indistinct.

28. **B. ruficornis,** Lec. New Spec. Col. (Smithsonian 8vo), 53.—Blackish-brown, base of antennæ and legs yellow-brown; elytra usually yellow-brown, more densely and finely punctured than in the allied species. Head opake, densely granulated, frontal suture distinct, occipital fovea and transverse line small; feebly and sparsely punctured behind. Prothorax wider than long, rounded on the sides, hind angles obtuse but distinct; disc densely granulated, opake, distinctly but not strongly punctured, dorsal line fine. Elytra less convex than in the allied species, and more finely and densely punctured. Dorsal segments sparsely punctulate, ventrals strongly but finely and rather densely punctured. Flanks of prothorax concave behind, but less so, and nearly flat in front, episterna rather wide. Mentum feebly impressed. Length 3 mm; .12 inch.

♂.—Eighth ventral with a deep acute triangular impression.

San Mateo and San Bernardino, Cala.; many specimens. This species closely resembles *B. laticollis*, and differs only by the sexual characters, the elytra more finely punctured, and by the hind angles of the prothorax being distinct, and not entirely obliterated. Specimens collected by Dr. Horn in South-eastern California, are intermediate in these characters and indicate that one of these species might have developed from the other at a recent geological time.

29. **B. divisus,** Lec. New Spec. Col. (Smithsonian 8vo), 53.—Black, head and prothorax nearly opake, and very finely granulated, antennæ and legs piceous, tibiæ and tarsi paler. Head flat, feebly punctulate. Prothorax a little wider than long, sides rounded, hind angles obtuse, distinct; disc finely not densely punctured, dorsal line fine. Elytra yellow, with the sides and a large common triangular space from the humeri to the tip of the suture black; rather strongly and densely punctured. Dorsal segments shining, sparsely punctured, ventrals finely and densely punctured. Side margin of prothorax acute, groove of the side deep, narrow, episterna narrow. Length 3 mm; .12 inch.

♂.—Eighth ventral segment acutely and deeply incised; ♀ with the same segment rounded at tip and slightly impressed.

Kansas, Lake Superior and Canada.

30. **B. pleuralis,** n. sp.—Similar in all characters to *B. divisus*, except that the yellow part of the elytra is defined by a curved instead of a straight line, so that the common triangular spot noted in that species becomes a broad sutural stripe, rounded behind and expanded in front, so as to occupy the base. Length 3 mm; .12 inch.

♂.—Eighth ventral segment longitudinally impressed; ♀ not impressed.

San Bernardino and Stockton, Cala.; Mr. Crotch; several specimens all more or less mutilated.

31. **B. diagonalis,** Lec. New Spec. Col. (Smithsonian 8vo), 52.—Black, thinly clothed with very short golden pubescence, antennæ piceous, legs reddish-yellow. Head and prothorax very finely granulated, opake, sparsely and finely punctured; the latter with the dorsal line very fine, sides much rounded, hind angles obtuse and somewhat rounded. Elytra dark dirty yellow, with a large common triangular spot extending from the humeri nearly to the tip of the suture blackish; epipleuræ fuscous. Dorsal segments shining, punctulate, especially towards the sides, last two segments piceous; ventrals finely punctured. Side margin of prothorax acute, episterna narrow, concave. Mentum flat, opake. Length 4.7 mm; .185 inch.

♂.—Eighth ventral segment not impressed, rounded at tip.

One specimen collected by me at San Diego, Cala., in salt marsh.

32. **B. tau,** n. sp.—Black, antennæ, palpi, legs and elytra rufo-testaceous; base and suture of the last black. Head and prothorax subopake, very finely granulated, the former less distinctly finely punctured; the latter finely and sparsely punctured, with the dorsal line very fine; sides much rounded, hind angles obtuse, distinct. Elytra finely and densely punctured. Dorsal segments shining, nearly smooth; ventrals finely punctured, tip piceous. Flanks of prothorax very slightly concave, side margin acute, episterna wider in front than at the coxal fissures which are long, narrow and open. Mentum flat, opake. Length

♂.—Eighth ventral with two fine distant impressed lines, converging slightly; intermediate space feebly impressed at the middle.

One specimen, New York. The elytra although finely, are more strongly punctured than in the next species.

33. **B. ornatus,** Lec. New Spec. Col. (Smithsonian 8vo), 53.—Black, pruinose with very short yellowish pubescence, antennæ piceous, legs, sides of elytra and large apical blotch extending more than half way to the suture pale yellow. Head and prothorax opake, very finely granulated, obsoletely punctulate, dorsal line not apparent, sides more obliquely and less strongly rounded than in the neighboring species, hind angles obtuse, not at all rounded, but even slightly prominent. Elytra finely and densely punctured, yellow lateral stripe sometimes confined to the epipleuræ, sometimes much wider, dilated behind into a large apical blotch also variable in size; they are more than one-half longer than the prothorax and the sutural angle is more rounded than usual. Dorsal segments somewhat shining, punctulate towards the sides; ventrals densely punctulate. Side margin of prothorax acute, episterna slightly concave, not wider in front. Mentum flat, opake. Length 3.7—4.2 mm; .14—.165 inch.

♂.—Eighth ventral with a small acute triangular incision closed by membrane.

San Francisco, Cala.; many specimens. This species must be closely allied to *B. albonotatus*, Mäklin, (Bull. Mosc. 1853, ii, 193), from Alaska. The description of the latter, however, mentions that the legs are dark, with the tarsi and the posterior tibiæ alone yellow. The pale sides of the elytra are also not mentioned. It may perhaps be an extreme variety, as there are great differences in the markings

of the specimens before me; the coxæ and legs are, however, yellow in all.

34. **B. sutnralis,** Lec. New Spec. Col. (Smiths. 8vo), 53.—Blackish-brown, antennæ testaceous, outer joints piceous, legs and elytra testaceous, the latter with the suture, and sometimes the base fuscous. Head and prothorax finely granulated, nearly opake; the former with a very small occipital fovea, and a few scattered punctures; the latter finely and sparsely punctured; dorsal line very fine, hind angles obtuse, not rounded. Elytra finely and deeply but not very densely punctured, sutural angle very much rounded. Dorsal segments shining, sparsely punctulate towards the sides; ventrals finely not densely punctulate. Side margin of prothorax acute, episterna narrow, concave. Mentum flat, opake. Length 3 mm; .12 inch.

Banks of Gila River, Arizona. No sexual differences observed in the four specimens in my collection.

35. **B. phytosinus,** n. sp.—Slender, yellow-testaceous, head and penultimate dorsal segment dusky. Head very finely alutaceous, with a small occipital puncture. Prothorax wider than long, finely granulate, opake, deeply but finely punctured, dorsal line fine, abbreviated at each end, sides feebly rounded, except towards the base, hind angles indistinct. Elytra strongly rather densely, but not coarsely punctured, sutural angle very much rounded. Dorsal segments sparsely punctulate, ventrals more distinctly punctulate. Side margin of prothorax acute, episterna narrow, concave. Mentum flat, opake, with a small basal fovea. Length 2.5 mm; .10 inch.

♂.—Seventh ventral segment obtusely prolonged behind; eighth truncate at tip, broadly but not deeply concave.

One specimen, Southern California; collected by Mr. Crotch. The form and color give to this species much resemblance to those of the genus after which I have named it.

36. **B. cognatus,** n. sp.—This species is larger than the next, and exactly resembles it in form and sculpture; the head and occasionally the dorsal segments one to six are darker, and the elytra are not at all fuscous along the suture; otherwise the color is a uniform reddish-yellow. Length 2.5 mm; .10 inch.

Carolina to Texas; the eighth ventral segment of the ♂ is deeply triangularly impressed.

37. **B. emarginatus,** Say, (*Oxybius*, Tr. Am. Phil. Soc. iv, 461; ed. Lec. ii, 577; Er. Staph. 780; *B. longicornis*, Er. ibid, 775. Blackish, antennæ, legs and elytra pale, the latter with the suture dusky. Head and prothorax shining, polished, sparsely but deeply punctured, the former convex, frontal impressions short, supra antennal ridges very small; epistoma convex, with the angles slightly elevated, and the front margin subemarginate. Prothorax a little wider than long, sides rounded into the base, hind angles wanting. Elytra finely not very densely punctured, sutural angle very widely rounded. Dorsal segments very sparsely, ventrals sparsely punctulate. Side margin of prothorax acute, episterna narrow, concave. Length 2 mm; .08 inch.

♂.—Eighth ventral segment truncate and subemarginate at tip, deeply longitudinally impressed.

Southern, Middle and Western States.

Group 5.—*cordatus.*

In this group the side margin of the prothorax is acute, and the flanks deeply but narrowly concave; the prosternal sutures are obliterated, and the coxal fissures are short and closed; the hind angles are obtuse. The mandibles vary in form according to species, but the apical part is slender.

Head and prothorax subopake, the former convex.....2.
Head and prothorax opake, densely granulated, the former flat.....3.
2.—Black, antennæ, tibiæ and tarsi testaceous-brown; elytra pale yellow, with the basal margin and sutural bead blackish.....38. **basalis.**
Black, antennæ, tibiæ and tarsi dark testaceous; elytra with the basal half black, the apical half pale yellow.....39. **dimidiatus,** n. sp.
3.—Legs yellow, elytra with a dusky sutural cloud.....4.
Legs pale fuscous, body brown, elytra fusco-testaceous.....40. **opaculus.**
4.—3.5 mms. long; prothorax wider than long.....41. **cordatus.**
1.7 mms. long; prothorax scarcely wider than long.....42. **forcipatus.**

38. **B. basalis,** Lec. New Spec. Col. (Smithsonian 8vo), 54.—Black, head subopake, very finely granulate; not densely but finely punctured; convex; antennal ridges very small, frontal impressions indistinct; epistoma with the front angles slightly prominent. Antennæ testaceous, first and last joints darker. Prothorax a little wider than long, sides nearly parallel in front, then obliquely rounded, hind angles obtuse, not very distinct; disc convex, strongly, though finely punctured, dorsal line indistinct. Elytra finely not densely punctured, pale yellow, base and narrow sutural margin blackish; sutural angle not much rounded. Dorsal segments shining, sparsely, the ventrals less sparsely punctulate. Legs piceous, tarsi and posterior tibiæ testaceous. Side margin of prothorax acute, flanks narrowly but strongly concave, prosternal sutures obliterated, coxal fissures short, closed. Mandibles obtusely toothed, apical part not very long, slender. Length 2.5—3 mm; .10—.12 inch.

♂.—Eighth ventral segment with a small deep triangular impression.

Atlantic coast, New York to Florida. The specimens from the latter locality are larger, with the elytra rather more strongly punctured, but do not otherwise differ. The bristles of the posterior abdominal segments are longer in this and the other species of this group than in any of the preceding groups.

39. **B. dimidiatus,** n. sp.—This species resembles the preceding in all respects, except that the prothorax is very distinctly wider than long, and less deeply punctured. The elytra are more strongly punctured, and the basal half is black, the apical half pale yellow; the epipleuræ are entirely black, and

the line dividing the colors is slightly oblique backwards towards the suture. Length 2.5 mm; .10 inch.

One ♀, Enterprize, Florida, May 24th; Messrs. Hubbard and Schwarz.

40. **B. opaculus,** Lec. New Spec. Col. (Smithsonian 8vo), 54.—Fuscous, elytra paler, opake, finely and densely rugosely punctured. Head opake, finely granulated, flat, sparsely punctured. Prothorax wider than long, sides nearly straight in front, then rounded, hind angles very obtuse, but distinct; finely granulated, opake, finely punctured, dorsal line obsolete. Dorsal segments shining, nearly smooth; ventrals strongly punctulate. Side margin of prothorax acute, flanks with a narrow deep marginal groove, prosternal sutures effaced, coxal fissures short, closed. Mandibles long and slender, acutely toothed at the middle; mentum with a rounded impression. Legs pale fuscous. Length 4 mm; .16 inch.

♂.—Eighth ventral segment with two distant slightly converging impressed lines, and a faint longitudinal impression.

One pair, coast of Maine, Mr. W. Stimpson; a similar one found by me at Coney Island, New York: they are unfortunately all immature.

41. **B. cordatus,** Say, (*Oxytelus*), Trans. Am. Phil. Soc. iv, 461; ed. Lec. ii, 576; Er. Staph. 780.—Black, antennæ testaceous, darker at tip; legs yellow; elytra yellow with a large common fuscous blotch, which is smaller, or even obsolete in immature specimens. Head broad, flat, finely granulated, opake. Prothorax finely granulated, opake, one-third wider than long, sides subparallel, rounded behind, hind angles obtuse, indistinct; disc punctulate, dorsal line obsolete. Elytra finely and densely punctured, sutural angle not much rounded. Dorsal segments shining, nearly smooth; ventrals strongly punctulate, tip dark testaceous. Side margin of prothorax acute, flanks with a narrow marginal groove, prosternal sutures wanting, coxal fissures very short, closed. Length 4 mm; .16 inch.

♂.—Eighth ventral segment with a feeble and narrow triangular impression.

Atlantic coast from New York to Georgia. Immature specimens are pale brown, with the head, prothorax and penultimate dorsal segment darker. The mentum has a small basal circular impression. The mandibles are long and slender, with an acute tooth about the middle. The base of the elytra is sometimes also fuscous.

42. **B. forcipatus,** Lec. New Spec. Col. (Smithsonian 8vo), 54.—Piceous, legs and antennæ testaceous, the latter dusky at tip; elytra pale yellow, with the base, and sutural band dilated behind, but not extending to the tip, dusky. Head opake, flat, finely granulated. Prothorax a little wider than long, sides nearly straight in front, rounded behind, angles indistinct; disc opake, finely granulated, punctulate, dorsal line indistinct. Elytra densely and finely punctured, sutural angle well rounded. Dorsal segments nearly smooth, ventrals sparsely punctulate. Side margin of prothorax acute, flanks with a narrow marginal groove, prosternal sutures wanting, coxal fissures short, closed.

Mandibles very long and slender, acutely toothed near the middle. Length 1.7 mm; .07 inch.

♂.—Eighth ventral segment with a small triangular impression.

Two specimens, banks of the Colorado River, California, at Fort Yuma.

OXYTELUS Grav.

The species of this genus are less numerous than those of Bledius, and do not seem to be capable of arrangement into well-defined groups, which are separated by any important structural differences. They are nevertheless easily recognized by size, color and sculpture, while in most of them the male sexual characters are quite distinct, even in the most nearly allied species.

Prothorax coarsely sculptured, more or less shining.....2.
Prothorax very finely strigose, quite opake.....11.
Prothorax finely sparsely punctured, shining, without grooves; black, legs and elytra bright yellow..... 1. **incolumis.**
2.—Head prolonged behind the eyes.....3.
Head rounded immediately behind the eyes, which are prominent; front flat, opake; prothoracic grooves deep, elytra rugosely punctured; piceous, base of antennæ and legs testaceous.....2. **sculptus.**
3.—Sides of prothorax crenulate; prothoracic grooves deep.....4.
Sides of prothorax entire.....5.
4.—Piceous, front flat, opake, base of antennæ and legs testaceous...3. **rugosus.**
Usually black, front convex, shining.....4. **niger,** n. sp.
5.—Front concave, apical margin elevated.....6.
Front flat, not margined at apex; head with long parallel impressions.....8.
6.—Prothoracic grooves deep, entire, front deeply concave.....7.
Outer grooves feeble; posterior impressions of head short.
5. **pensylvanicus.**
7.—Posterior impressions of head parallel.....6. **fuscipennis.**
Posterior impressions of head converging.....7. **convergens,** n. sp.
8.—Vertex convex, feebly channeled.....9.
Vertex flat, not channeled; head very dissimilar in the sexes; prothorax strongly punctured, dorsal grooves deep.....8. **insignitus.**
9.—Elytra strongly punctured, prothoracic grooves deep...9. **punctatus,** n. sp.
Elytra more depressed and more densely punctured.....10.
10.—Front polished, dorsal grooves distinct.....10. **nitidulus.**
Front opake, dorsal grooves distinct.....11. **sobrinus,** n. sp.
Front opake, dorsal grooves obsolete.....12. **placusinus,** n. sp.
11.—Anterior tibiæ slender, truncate at tip, dorsal segments smooth.....12.
Anterior tibiæ as usual, obliquely emarginate on the outer side; dorsal segments densely punctulate.....13. **depressus.**
12.—Grooves of prothorax deep, head less opake.....14. **nanus.**
Grooves of prothorax feeble, head and prothorax entirely opake.
15. **exiguus.**

1. **O. incolumis,** Er. Staph. 791.—♂. Seventh ventral with a prominent middle lobe, which is truncate at tip. ♀. Seventh ventral bisinuate, middle lobe broadly rounded.

Southern States. Easily known by the shining black color, prothorax without grooves, and the bright yellow elytra and legs.

2. **O. sculptus,** Grav. Mon. 191; Say, Tr. Am. Phil. Soc. iv, 460; ed. Lec. ii, 575; Er. Staph. 788, etc.; *O. mœrens,* Mels. Pr. Ac. Nat. Sc. Phil. ii, 42.—♂. Seventh ventral with two deep narrow incisions; middle lobe broad, truncate, feebly impressed, not longer than the side lobes. Eighth ventral broadly concave.

Middle, Southern and Western States, and Vancouver's Island. Also in Europe.

3. **O. rugosus,** Er. Col. March, 588; Staph. 786, etc.; *Staphylinus rug.* Fabr. Syst. Ent. 267, etc.; *O. rugulosus,* ‡ Harris, Tr. Hartford Nat. Hist. Soc. 49; *O. basalis,* Mels. Pr. Ac. Nat. Sc. Phila. ii, 41.—♂. Fifth ventral segment with an elevated tubercle at the middle of the hind margin. Seventh ventral deeply and broadly trilobed.

Canada, Massachusetts and Pennsylvania. Also in Europe.

4. **O. niger,** n. sp.—Narrower and less depressed than usual, black, shining, legs blackish-brown. Head ovate, nearly as wide as the prothorax, wider behind the eyes, which are very small, and not prominent; surface punctured, front slightly convex, frontal suture entirely wanting; antennal ridges short, obtuse; vertex obsoletely channeled, occipital impressions wanting. Prothorax twice as wide as long, sides rounded, feebly crenulate, hind angles rounded; surface strongly not densely punctured, dorsal grooves deep, straight. Elytra not longer than the prothorax, strongly punctured. Dorsal and ventral segments sparsely punctulate. Length 2.5—4.3 mm; .10—.17 inch.

♂.—Sixth ventral segment with a small tubercle at the middle, and two nearly confluent very small cusps on the hind margin. Seventh ventral bisinuate, middle lobe broad, not longer than the lateral lobes. Eighth ventral not impressed

♀.—Seventh ventral strongly bisinuate, middle lobe rounded, longer than the lateral lobes.

San Francisco, Cala.; three specimens. British Columbia, one specimen. This last is of small size, piceous, with the elytra paler; the base of the antennæ and legs are testaceous.

5. **O. pensylvanicus,** Er. Staph. 792.—♂. Seventh ventral segment slightly tuberculate, near the hind margin bisinuate, middle lobe scarcely longer, truncate and emarginate at tip. Head larger than in the ♀, and more quadrate behind the eyes.

Middle and Southern States abundant.

6. **O. fuscipennis,** Mann. Bull. Mosc. 1843, ii, 233.—♂. Seventh ventral with two deep incisions, middle lobe short and broad, truncate at tip. Eighth with deep medial groove. ♀. Seventh ventral feebly prominent and retuse at the middle of the hind margin. Eighth slightly concave.

Alaska, British Columbia, Kansas, Illinois, Pennsylvania. The epistoma of the ♂ is more deeply concave than that of the ♀, and the head is more dilated behind the eyes.

7. **O. convergens,** n. sp.—Depressed, piceous, shining, base of antennæ and legs testaceous; elytra darker testaceous, coarsely aciculately punctured. Head prolonged behind the eyes, which are small and convex; surface coarsely punctured, posterior impressions moderately long, converging obliquely forwards to the front, which has a short longitudinal line; epistoma deeply concave, smooth at the bottom, strongly margined. Prothorax strongly punctured; the three dorsal grooves are deep and entire, the lateral impressions broad as usual. Dorsal and ventral segments finely and sparsely punctulate. Length 3.4 mm; .13 inch.

♂.—Head as wide as the prothorax, sides parallel behind the eyes, then suddenly rounded and constricted. Seventh ventral with a broad flat trapezoidal medial lobe, which is truncate at tip, and nearly as long as the eighth segment.

♀.—Not seen.

One specimen, Sandy Point, Florida. Messrs. Hubbard and Schwarz.

8. **O. insignitus,** Grav. Mon. 188; Er. Staph. 793; *O. americanus,* Mann. Brachelytra, 48.—♂. Head large, quadrate, nearly smooth, strigose each side behind the eyes; epistoma prolonged at the middle and acuminate; mandibles very long, slender, falcate; seventh ventral segment feebly bisinuate at tip.

♀.—Head not as wide as the prothorax, rounded behind the eyes, sparsely punctured, punctures smaller in front, epistoma subtruncate; mandibles moderate in length; seventh ventral broadly rounded at tip.

Atlantic slope from New York to Florida and Kansas, abundant. In this species the sexual differences are mainly in the head, and the abdominal characters are consequently very feeble, as already mentioned in the prefatory remarks to this memoir.

9. **O. punctatus,** n. sp.—Black, shining, elytra dark-brown, legs yellow-brown. Head sparsely punctured, epistoma quadrate, depressed, nearly smooth, separated by a transverse impression; frontal and posterior impressions almost united; vertex convex, with a short longitudinal impression; sides parallel for a short distance behind the eyes, then suddenly rounded and constricted; eyes convex, not very prominent. Prothorax a little wider than long, coarsely punctured, middle groove deep, the other two less defined; side impressions large, shallow. Elytra depressed, strongly rugosely punctured. Dorsal segments smooth; ventral sparsely very finely punctulate. Length 2 mm; .08 inch.

Vancouver's Island and British Columbia; Mr. G. R. Crotch. I observe no sexual characters in fourteen specimens examined. Two of them are rather larger, but do not otherwise differ.

10. **O. nitidulus,** Grav. Micr. 107; Mon. 186; Er. Staph. 792, etc.; *O. rugulosus*, Say, Tr. Am. Phil. Soc. iv, 460; ed. Lec. ii, 576.

Middle, Western and Southern States; the only sexual difference is that mentioned by Erichson; the sixth ventral segment is very slightly emarginate in the ♂. The synonym is on the authority of Erichson. It seems to me an incorrect determination, but as Say described his species from Mexico, the question does not concern us at the present time.

11. **O. sobrinus,** n. sp.—Piceous, less shining than *O. punctatus*, much as in *O. nitidulus;* legs pale. Head sparsely punctured behind, more coarsely at the sides; epistoma subopake, quadrate, depressed, smooth, vertex convex, channeled; frontal and posterior impressions nearly united; sides rounded behind the eyes, which are slightly prominent. Prothorax densely and coarsely rugosely punctured, dorsal grooves distinct, middle one limited by two ridges more prominent than usual; lateral impressions broad, shallow. Elytra depressed, densely and coarsely aciculate. The other characters as in the two preceding species. Length 2 mm; .08 inch.

California, two specimens; no sexual differences observed.

12. **O. placusinus,** n. sp.—Very depressed, fuscous, nearly opake, abdomen shining. Head densely rugosely punctured behind, front less depressed, nearly smooth, subopake; vertex slightly convex, impressed; sides prolonged and rounded behind the eyes, frontal and occipital impressions nearly united. Prothorax very densely rugosely punctured, dorsal grooves obsolete, the middle one and the lateral impression being faintly indicated; sides less rounded than usual; hind angles obtuse, not rounded. Elytra punctured like the prothorax. Dorsal segments smooth, ventral finely and rather densely punctured. Length 2.3 mm; .09 inch.

♂.—Sixth ventral segment with a small acute projecting angle at the middle of the posterior edge; eighth segment broadly concave.

Two specimens found by Mr. H. Ulke, in ants' nests near Washington, D. C., one of which he has kindly placed in my collection. The dull lustre is owing to the closeness of the punctures, and not to the want of polish of the very narrow interspaces. This species bears a strong resemblance to *Placusa* of the Aleocharini in form of body, and this superficial likeness is increased by the hind angles of the prothcrax being more distinct than usual, and the sides less rounded.

13. **O. depressus,** Grav. Micr. 103; Er. Staph. 796, etc.— ♂. Head large, flat, almost wider than the prothorax; sixth ventral segment slightly and broadly emarginate.

♀.—Head somewhat narrower than the prothorax, less flat; sixth ventral (broken in my specimen, described by Erichson as slightly triangularly prolonged at the middle).

One pair found by me in Indiana. These specimens agree accurately with the description given by Erichson, of this common Eu-

ropean species. It is easily known by the sexual characters, and the finely but rather densely punctured dorsal segments.

14. **O. nanus,** Er. Staph. 797.—♂. Seventh ventral feebly bisinuate at tip; ♀, slightly triangularly produced, (Er.)

One specimen, Carolina, Dr. Zimmermann. In this species the head and thorax are less opake than in the next; the dorsal grooves are deep, and the antennæ are entirely black. It is a very small insect, being only 1.2 mm; .05 inch long.

15. **O. exiguus,** Er. Staph. 798; *O. pygmæus,* Mels. Pr. Ac. Nat. Sc. Phil. ii, 41.

Middle and Southern States. The sexual characters are much as in the preceding, and the size is about the same. The specimens in my collection would seem to indicate one or two allied species, but the material is not sufficient to enable me to define them. The head and prothorax are entirely opake, the dorsal grooves are wide and shallow, and the base of the antennæ is piceous.

This and the preceding species differ remarkably from the others by the front tibiæ not being obliquely truncate or emarginate on the outer side near the tip, but slender and truncate at tip. *O. parvulus,* Mels. (l. c. supra), does not seem to differ from this species.

PHLŒONAEUS, Er.

Although one species of this genus before it was properly defined by Erichson,* had been separated by Stephens from *Oxytelus* as a distinct genus under the name *Aploderus,* this separation had been made upon the very unimportant character of the sculpture of the prothorax. The latter, namely, in *Phlœonaeus* has but two dorsal grooves, while in most *Oxyteli,* as has been seen in the foregoing descriptions, there are three. Yet as in some species the outer grooves (*pensylvanicus*), become feeble, and in others all three (*incolumis, placusinus*), are obliterated, it is obvious that this character is of no value for founding a genus, and the name proposed by Stephens not having been adopted by Erichson, who had the right to make the choice, must be considered as not published.

But one species has yet occurred in our fauna:

P. linearis, Lec. (*Haploderus*), New Spec. Col. (Smithsonian 8vo), 54.—The front tibiæ are slender, entire, and truncate at tip, as in the European *P. casus,* with which it also agrees in sexual characters. ♂. Seventh ventral

* Käfer, Mark Brandenb. 597, 1837.

segment feebly and broadly emarginate. ♀. Seventh ventral with an obtuse broad triangular process behind.

Vancouver's Island, Oregon, California; many specimens.

Phlœonœus bimpressus, Mäklin, Bull. Mosc. 1852, ii, 319; and *Haploderus laticollis*, Lec. New Spec. Col. 55, do not belong to this genus. The front tibiæ are not spinose, and they seem from the presence of a distinct scutellum in the former, and its absence in the latter to belong respectively to *Ancyrophorus* and *Trogophlœus*.

THINOBIUS, Kiesenwetter.

The species of this genus are of very small size, and linear depressed form, greatly resembling in appearance minute Aleocharini (*Homalota*, etc.). They are easily known from species of allied genera by the sutural angle of the elytra being broadly and obliquely rounded, so as to leave an angle, in which the wings are visible, except in *T. brachypterus*, which is quite anomalous.

The species seem to be allied to those of Europe, and perhaps on comparison may profitably be united with some of them as only slightly modified forms.

Those in my collection are easily separated as follows: the table is made to correspond as far as possible with that given by Fauvel in his excellent work, Faune Gallo-Rhenane, iii, 118, for the French species.

Surface entirely without lustre, velvety.....2.
Surface somewhat shining, pubescent, distinctly punctulate; elytra brownish, not much longer than the prothorax; antennæ and legs piceous.
1. **gigantulus**, n. sp.
2.—Antennæ and legs reddish-yellow.....3.
Antennæ and legs piceous or black.....4.
3.—Elytra twice as long as the prothorax which is feebly channeled and impressed.....2. **oxytelinus**, n. sp.
Elytra one-third longer than the prothorax which is not impressed.
3. **flavicornis**, n. sp.
4.—Elytra much longer than the prothorax.....5.
Elytra transverse, shorter than the prothorax, sutural angle not truncate, scarcely rounded.....4. **brachypterus**, n. sp.
5.—Elytra thinly fringed at tip with long hairs.....5. **fimbriatus**, n. sp.
Elytra not fringed, pubescence very short.....6. **macropterus**, n. sp.

1. **T. gigantulus**, n. sp.—Elongate, linear, shining, almost uniformly finely punctulate and pubescent, black; elytra brown, legs fuscous. Antennæ piceous, first and second joints stout, third much narrower, the other joints gradually wider, outer ones (eighth to tenth) distinctly transverse, all of them setose with long stiff hairs; eleventh larger and as long as the two preceding.

Head large, broadly rounded behind, broadly concave (a sexual character?) Prothorax wider than long, slightly narrowed behind, truncate in front, broadly rounded at base, sides nearly straight, disc longitudinally impressed. Elytra one-third longer than the prothorax and not wider. Length 1.4 mm; .05 inch.

Texas, Belfrage; two specimens. In one the dorsal impression of the prothorax is strongly marked, in the other it is merely an impressed line, distinct at base, but obsolete in front. I do not know if this be a sexual character or an individual deformity.

2. **T. oxytelinus,** n. sp.—Broader, more depressed, without lustre, dull blackish-brown; elytra reddish, antennæ and feet yellow-testaceous; antennæ gradually thickened externally, outer joints rounded, scarcely transverse; head not so wide as the prothorax, slightly narrowed and rounded behind the eyes. Prothorax wider than long, strongly rounded on the sides, more broadly at the base, hind angles very obtuse and rounded; disc indistinctly channeled, and broadly impressed near the sides. Elytra twice as long as the prothorax, reddish-brown, base and margins dusky; sutural angle very much rounded. Length .08 mm; .03 inch.

One specimen; Oak Grove, California.

3. **T. flavicornis,** n. sp.—Narrower, depressed, without lustre, brown; abdomen blackish; antennæ and legs testaceous, the former with the outer joints larger, rounded, scarcely transverse, slightly darker. Head scarcely narrower than the prothorax, rounded behind. Prothorax not longer than the head, rounded on the sides, nearly truncate before and behind, angles much rounded. Elytra one-third longer than the prothorax. Length .07 mm; nearly .03 inch.

Two specimens, salt marsh, Coney Island, near New York. A badly preserved specimen from Lake Superior seems to belong to this species, but its condition does not permit of accurate determination.

4. **T. brachypterus,** n. sp.—Narrow, depressed, entirely dull black, opake, finely pubescent. Antennæ stout, scarcely longer than the head and thorax, outer joints transverse. Head not narrower than the prothorax, sides nearly parallel behind the eyes, base broadly truncate. Prothorax wider than long, rounded at the sides, slightly narrowed behind, angles rounded into the base. Elytra not wider and hardly as long as the prothorax, finely punctulate, sutural angle very slightly rounded. Abdomen densely punctulate. Length .06 mm; .025 inch.

Detroit, Michigan, found in abundance by Messrs. Hubbard and Schwarz. This species is anomalous by the very short elytra, and much less rounded sutural angle but does not appear to differ otherwise.

5. **T. fimbriatus,** n. sp.—Less elongate, sooty brown, without lustre; head rounded, a little narrower than the prothorax. Antennæ entirely piceous, outer joints a little thicker, and slightly transverse. Prothorax twice as wide as long,

slightly emarginate in front, rounded on the sides and at the base. Elytra twice as long as the prothorax, sutural angle strongly rounded, apical margin fringed with long hairs. Legs piceous. Length .05 mm; .02 inch.

Detroit, Michigan, one specimen; Messrs. Hubbard and Schwarz.

6. **T. macropterus,** n. sp.—Less elongate, depressed, blackish-piceous, opake, finely pubescent. Head rounded, very little narrower than the prothorax. Antennæ entirely piceous, stout, longer than the head and prothorax, outer joints transverse. Prothorax twice as wide as long, slightly emarginate in front, rounded at the sides and base. Elytra frequently reddish-brown, pubescence very short and depressed; nearly three times as long as the prothorax, sutural angle strongly rounded. Abdomen densely punctulate. Legs piceous. Length .06 mm; .025 inch.

California, at various localities. The pubescence is scale like and tinged with golden upon the prothorax and elytra.

ANCYROPHORUS Kraatz.

This genus is easily distinguished from *Trogophlœus*, by the fourth joint of the maxillary palpi being longer, and gradually tapering from base to tip, which is rounded; thus though acicular, it is much larger and more distinct than in *Trogophlœus;* the front coxal cavities are widely angulated externally, and a large trochantin is visible; the prosternal sutures are short, fine, but distinct; the side margin of the prothorax is distinct, and not deflexed to the under surface near the front angles. The scutellum is variable in the three species in our fauna; large in *A. planus*, smaller in *bimpressus*, and not visible in *annectens*. This last species makes therefore an excellent passage (in this respect, but in no other), to *Trogophlœus*.

Elytra strongly punctured, color brown.....2.
Elytra, head and prothorax very finely and densely punctured, color black, scutellum large.....1. **planus,** n. sp.
2.—Prothorax sparsely and very finely punctured, with an oblique impression each side near the base; scutellum small.....2. **bimpressus.**
Prothorax sparsely and coarsely punctured, with two vague oblique impressions each side of the dorsal line; scutellum invisible.
3. **annectens,** n. sp.

1. **A. planus,** n. sp.—Black, very depressed, finely pubescent, head, prothorax and elytra finely and densely punctulate. Prothorax wider than long, much rounded on the sides in front, then slightly narrowed, hind angles small, nearly rectangular, base broadly margined; dorsal line narrow, feebly elevated, prolonged behind so as to interrupt a curved vague impression which follows the outline of the base. Scutellum large, flat, triangular, rounded behind. Elytra more than twice as long as the prothorax, and nearly one-fourth wider. Abdomen very finely punctulate above, densely and more distinctly beneath. Tibiæ at tips, tarsi and palpi piceo-testaceous. Length 2.7 mm; .11 inch.

Lake Superior, and White Mountains, N. H. I observe no sexual differences in the specimens examined. This species is cited in my List of Coleoptera, but I neglected to describe it.

2. **A. biimpressus,** Mäklin, Bull. Mosc. 1852, ii, 319.—Depressed, brown, shining, slightly pubescent, head and abdomen darker. Head sparsely punctured; antennæ paler at base, outer joints transverse. Prothorax a little wider than long, rounded on the sides, narrowed behind, angles rounded, base rounded, disc sparsely very finely punctured, broadly obliquely impressed each side near the base; dorsal line narrow, smooth, very finely channeled, not elevated. Scutellum small, triangular. Elytra twice as long as the prothorax, and about one-third wider, rather strongly punctured. Dorsal segments nearly smooth, ventral very finely and sparsely punctulate. Length 3 mm; .12 inch.

Alaska; two specimens kindly sent me by Prof. Mäklin and Count Mniszech.

3. **A. annectens,** n. sp.—Dark-brown, shining, slightly pubescent, legs testaceous. Head rather strongly punctured, nearly smooth in front. Prothorax nearly twice as wide as long, much rounded on the sides in front, then obliquely and strongly narrowed to the base which is nearly straight, angles obtuse and rounded; disc coarsely and deeply punctured, dorsal line rather broad, elevated; an oblique impression each side near the base, and another in front of the middle; between them is a small smooth callus. Scutellum invisible. Elytra twice as long, and a little wider than the prothorax, densely but not finely punctured. Dorsal segments nearly smooth, ventral finely and sparsely punctulate. Length 3 mm; .12 inch.

San Mateo, Cala.; one specimen. The antennæ are somewhat less thickened externally than in *A. bimpressus*, and the last joint of the maxillary palpi is rather more slender. The under surface of the prothorax is, however, entirely similar in these three species.

TROGOPHLŒUS Mann.

The species here assembled under this generic name agree in having the front tibiæ not spinose, the second joint of the tarsi with a long spine, or stout seta extending beneath as far as the end of the third or last joint; the claws are large, the scutellum invisible, and the middle coxæ are contiguous.

They differ among themselves in other respects, such as the distance of the eyes from the base of the mandibles, and the consequent presence or absence of a distinct concave space for the reception of the first joint of the antennæ. The form of the third joint of the maxillary palpi, and the size of the fourth joint also varies; the latter is always acicular, but sometimes so small as to be indistinct. The form of body differs greatly in different species, and exhibits a tendency to imitate

genera of widely diverse tribes. I have observed something similar in various members of the Staphylinidæ, and more rarely in other series of Coleoptera, but will have occasion to recur to this subject at a later time, when I have studied the phenomena more closely.

In all the species the lateral margin of the prothorax is deflexed near the front angles, so as to be visible from beneath for a short distance. The prosternal sutures are obliterated, the front coxal cavities are small and not angulated at the outer side.

The epipleural line is fine but distinct, and is distant from the extreme margin of the elytra except in *T. phlœoporinus;* the metathoracic epimera are in great part covered.

Our species may therefore be arranged in the following groups, which will perhaps be considered as distinct genera by those who are inclined to subdivisions of that grade.

I.—Eyes remote from the base of the mandibles; third joint of maxillary palpi elongate-triangular, fourth joint acicular distinct.

A.—Body slender, subcylindrical, very finely punctulate and pubescent; prothorax not impressed, front angles not well-defined.

B.—Body strongly depressed, finely punctulate and pubescent.

II.—Eyes extending to the base of the mandibles; third joint of maxillary palpi turbinate truncate, fourth small, acicular, distinct. Body broad depressed, prothorax transverse, rounded, with two wide impressions and dorsal ridge. Elytra with epipleural line strongly defined.

III.—Eyes extending nearly to the base of the mandibles; third joint of maxillary palpi ovate-elongate, last joint distinct or obsolete, according to species. Body depressed, strongly punctured; prothorax with a deep lunate impression near the base, front angles not prominent.

IV.—Eyes extending nearly to the base of the mandibles; third joint of maxillary palpi turbinate, truncate at tip; fourth joint very small, distinct. Body slender, head, prothorax and elytra coarsely punctured; prothorax with two parallel impressions, and intervening elevated dorsal line. Elytra with the epipleural line not far from the extreme margin.

V.—Eyes extending nearly to the base of the mandibles; third joint of maxillary palpi turbinate, last joint very small, frequently scarcely distinct. Body depressed, punctured, pubescent; prothorax with impressions each side of a dorsal elevated line. Epipleural line fine, distant from the extreme margin.

This last group contains the greater number of the species. They may be easily separated by the form, sculpture and impressions of the prothorax, but do not seem to present sufficient interest to occupy attention at present. I therefore leave them for a future occasion or another student.

Group I,—A.

1. **T. simplarius,** n. sp.—Slender, not depressed, black, not shining, very finely and densely punctulate, pruinose with extremely fine pubescence; tip of abdomen, palpi and tarsi piceo-testaceous. Eyes coarsely granulated, not very prominent; antennæ testaceous, scarcely as long as the head and prothorax, outer joints fuscous, transverse. Head with a distinct puncture at the vertex. Prothorax one-third wider than long, moderately rounded on the sides and narrowed behind; all the angles rounded and not prominent; disc uniformly slightly convex, without impressions, and witnout dorsal line. Elytra quadrate, not wider than the prothorax, slightly convex, feebly impressed near the scutellum, which is invisible. Abdomen and under surface similarly punctured, but more pubescent. Gula deeply channeled and foveate. Length 2.5 mm; .10 inch.

Coney Island, near New York; on salt marsh, in July.

I have two specimens from the same locality, in which the prothorax and elytra are brownish; the former comparatively less broad, and less narrowed behind. I do not know if these are sexual or specific characters, and merely mention them as worthy of future investigation.

2. **T. convexulus,** n. sp.—Of the same form as *T. simplarius,* and similar to it, except that it is smaller, a little stouter, and less finely punctulate. The antennæ are entirely black, and the legs piceous, with the tips of the tibiæ and tarsi paler. The fovea of the vertex is absent. The prothorax is quite similar, but there is a narrow smooth dorsal line; the elytra are much more distinctly punctulate. Otherwise there are no differences. Length 1.8 mm; .07 inch.

One specimen from Kansas, and one from New York.

3. **T. blediinus,** n. sp.—Of the same form as *T. simplarius,* but much smaller, more slender, black, very finely punctulate and pubescent, tips of tibiæ and tarsi testaceous. Antennæ entirely black, scarcely as long as the head and prothorax, outer joints transverse. Head with the vertex not foveate, eyes rather large and convex. Prothorax nearly as long as wide, rounded on the sides, moderately narrowed behind, all the angles rounded, disc not impressed, smooth dorsal line very narrow, sometimes not visible. Elytra a little wider and nearly one-half longer than the prothorax, moderately convex, slightly impressed near the scutellum. Length 1.8 mm; .07 inch.

San Diego, Mr. Crotch, also in Arizona; several specimens. Two specimens are more slender, with the elytra shorter.

4. **T. uniformis,** n. sp.—Rather broadar and less convex, black, very finely punctulate and pubescent. Vertex not foveate, antennæ not longer than head and prothorax, outer joints transverse; eyes less prominent. Prothorax wider than long, sides and angles rounded, slightly narrowed behind, without impressions, or smooth dorsal line. Elytra a little wider, and one-third longer than the prothorax, more distinctly punctulate. Legs piceo-testaceous. Length 1.2 mm; .05 inch.

Pennsylvania, Georgia; three specimens.

The last joint of the maxillary is smaller, and the third joint stouter and more turbinate than in the other species of this group.

Group I,—B.

5. **T. lithocharinus,** n. sp.—Very depressed, brownish-black, nearly opake, very finely punctulate and pubescent. Head as wide as the prothorax, eyes small, not prominent, posterior constriction sudden, hind angles rounded. Maxillary palpi with the third joint turbinate, truncate at tip, fourth joint slender, acicular, distinct. Antennæ extending to half the length of the elytra, not stout, fifth and following joints rounded, distant, gradually a little larger. Prothorax wider than long, sides strongly rounded in front, oblique near the base, where it is narrower, truncate before and behind, angles rounded. Elytra a little wider than the prothorax, and more than twice as long. Legs dark-brown, tarsi testaceous. Length 3 mm; .12 inch.

Puget Sound, Mr. G. Davidson. The punctuation is so fine as to be almost imperceptible; there are very vague traces of impressions on the prothorax, but hardly worth mentioning. The epipleural line of the elytra is very fine.

Group II.

6. **T. laticollis,** *Haploderus* ‡ *lat.* Lec. New Spec. Col. 55.

One specimen, S. Carolina, Dr. Zimmermann. Differs remarkably by the broader form, which resembles that of *Oxytelus*. The prothorax is very finely punctulate, the elytra rather strongly punctured. Length 2.5 mm; .10 inch.

Group III.

7. **T. arcifer,** n. sp.—Depressed, strongly punctured, more finely upon the dorsal segments, sparsely finely pubescent, legs yellow, base of antennæ piceous. Head moderately narrowed immediately behind the eyes, which are not very prominent; frontal impressions deep, antennal tubercles large. Antennæ a little longer than head and prothorax, much thicker externally. Prothorax nearly twice as wide as long, emarginate in front, much rounded on the sides and base, front angles not rounded; disc with a large deep curved impression near the base; dorsal line not apparent. Elytra wider than the prothorax and one-half longer. Tip of abdomen and under surface piceous, strongly and finely punctured. Maxillary palpi with the third joint elongate-ovate, fourth small, acicular, distinct. Length 2.8 mm; .11 inch.

♂.—Seventh ventral segment emarginate behind; eighth with a small narrow apical fissure.

Middle, Western and Southern States. The epipleural line of the elytra is fine, but distinct, and in the usual position, far from the margin.

8. **T. calederinus,** n. sp.—Not depressed, black, shining, finely sparsely pubescent, sparsely setose at the sides of the prothorax, elytra and abdomen. Head suddenly constricted a short distance behind the eyes, which are moderately convex, surface sparsely finely punctured, frontal impressions short, antennal tubercles moderate. Antennæ rather slender, a little longer than head and prothorax, outer joints broader, not transverse, last joint more pointed than usual. Maxillary palpi with the third joint elongate-ovate, rounded at tip, fourth joint obsolete. Prothorax much wider in front, and strongly rounded, narrowed and subsinuate on the sides towards the base, which is rounded; front angles rounded; disc sparsely very finely punctulate, with a very deep arcuated posterior impression, and two faint small impressions in front of the middle. Elytra wider than the prothorax, and somewhat longer, rather convex, strongly punctured, scutellar region impressed; epipleural line fine, not far from the extreme margin. Dorsal segments nearly smooth, ventrals more pubescent, obsoletely punctulate. Length 3 mm; .11 inch.

♂.—Seventh ventral squarely and deeply emarginate, with the base of the emarginate obtusely toothed; eighth segment channeled.

Texas, Mr. G. W. Belfrage, six specimens.

Group IV.

9. **T. phlœoporinus,** n. sp.—Ferruginous, shining, feebly pubescent, head, prothorax and elytra strongly punctured, abdomen punctulate. Head narrowed some distance behind the eyes, which are small, and not prominent. Antennæ stout, not longer than the head and prothorax, outer joints transverse. Prothorax not wider than long, sides rounded in front, obliquely narrowed behind, front angles not rounded, but also not prominent; disc coarsely not densely punctured, with the dorsal line smooth slightly elevated, limited by two broad longitudinal impressions extending from the base beyond the middle. Elytra not wider than the prothorax and a little longer, strongly punctured, impressed along the suture. Dorsal and ventral segments finely and rather densely punctulate, epipleural line distinct, not remote from the extreme margin. Length 2.2 mm; .09 inch.

Illinois, one specimen.

Group V.

Of this group I have nearly forty species, some of which seem to be very nearly allied to European forms, and in some instances have been recognized as identical. The only names I am able to cite for the described species are:

10. **T. quadripunctatus,** *Stenus 4-punct.* Say, Tr. Am. Phil. Soc. iv, 459; ed. Lec. ii, 575; *T. morio,* Er. Staph. 805.

Western and Southern States. Easily known by its larger size, subhexagonal prothorax, strongly punctured elytra and black legs.

11. **T. subtilis,** Er. Käfer Mark Brand. 606; Staph. 812, etc.

A European species, which has occurred in the Southern and Western States.

12. **T. fulvipes,** Er. Staph. 804.

Described from Porto-Rico; occurs in Florida and Louisiana.

13. **T. memnonius,** Er. Staph. 806.

Described from Egypt; identified by Mr. Fauvel, among specimens from the Southern States.

APOCELLUS Er.

The species of this genus resemble in form *Falagria* of the Aleocharini, but are easily known by the three-jointed tarsi, and the insertion of the antennæ under elevated frontal ridges. The species are few in number, and easily distinguished; others occur in the Antilles and South America, but not on the eastern continent.

So far as I have collected them they are found in cow dung, and in decomposing vegetable material.

Surface shining, highly polished.....2.
Head and prothorax opake; head large, truncate behind, prothorax trapezoidal.....1. **stilicoides,** n. sp.
2.—Sides of head oblique and rounded behind, base but slightly truncate; prothorax rounded or nearly so.....3.
Sides of head parallel behind; base broadly truncate; prothorax trapezoidal.....2. **analis,** n. sp.
3.—Prothorax rounded or nearly so.....3. **sphæricollis.**

1. **A. stilicoides,** n. sp.—Piceous, head and prothorax opake, finely slutaceous; base of antennæ and legs yellow-testaceous. Head large, feebly convex, sides parallel behind the eyes, base broadly truncate, hind angles rounded; frontal suture well-marked; vertex with a very short impressed line. Prothorax not very convex, narrower than the head and elytra, broader than long, trapezoidal with rounded angles, narrowed from the front to the base, which is scarcely margined; disc with a very obsolete short dorsal elevation. Elytra shining, convex, very finely punctulate, and thinly clothed with extremely short pubescence. Dorsal segments punctulate, almost as the elytra; ventral segments also punctulate, more distinctly pubescent. Length 2 mm; .08 inch.

♂.—Sixth ventral very slightly emarginate at the middle; seventh not prolonged, (almost invisible in my specimen).

♀.—Sixth ventral not emarginate; seventh triangularly produced, as in all the other species.

One pair, Enterprize and Baldwin, Florida; Messrs. Hubbard and Schwarz. This species by the opacity of part of the surface is related to the Amazonian *A. planus*, Sharp, Trans. Ent. Soc. London, 1876, 401.

2. **A. analis,** n. sp.—Rufo-testaceous, shining, smooth, last two dorsal segments of abdomen blackish. Head large, sides parallel behind the eyes, broadly truncate at base, hind angles rounded. Prothorax convex, wider than long, narrowed from the front angles to the base, sides straight, angles rounded, base

and inflexed flanks finely margined. Elytra convex, wider than the prothorax, Length 2.6 mm; .10 inch.

♂.—Sixth ventral produced into a large broadly and deeply excavated plate; seventh and eighth with a broad and deep longitudinal concavity.

Louisiana, Arizona, California. The excavation of the broad plate of the sixth ventral produces two large compressed curved wings, which are much more developed in the Western specimens than in the one from Louisiana. The head of the ♀ is a little smaller than that of the ♂, more rounded behind the eyes, and less truncate at base; in consequence of this great development of the sexual armament of the sixth segment, the seventh which is the more complex one in the next species, is simply broadly concave, and without lateral processes.

3. **A. sphæricollis,** Er. Staph. 813. tab. 2, f. 5; *Lathrobium sph.* Say, Trans. Am. Phil. Soc. iv, 455; ed. Lec. ii, 570; *Falagria globosa,* Mels. Pr. Ac. Nat. Sc. Phila. ii, 30; *Falagria longicornis,* Sachse, Ent. Zeitung. Stettin, 1852, 116; *F. amabilis,* Sachse, ibid.

Atlantic and Pacific slopes, Massachusetts to Florida, Texas, Kansas, Arizona and California. Varies greatly in color, and somewhat in the form of the prothorax, which is occasionally nearly as wide as the head, and less oval than usual; sometimes on the other hand, a little longer than wide and regularly oval.

The color also varies from blackish piceous, with the base of the antennæ and legs testaceous, but the thighs tinged with fuscous; to bright rufo-testaceous, the abdomen dark, and the head and outer joints of the antennæ fuscous; the under surface, except of the prothorax is also dark.

In a ♂ of this last mentioned form the plate of the sixth ventral segment is less developed than in the others, and does not project downwards, so as to form a membranous concavity on the terminal part of the segment. I consider this, however, as rather a want of development, than as indicating specific distinction.

The description of Dr. Melsheimer would not be recognized as belonging to this species, as the imperfect lenses he used, and the bad condition of the specimen caused it to appear to him minutely punctured.

♂.—Sixth ventral segment with a short broad process, forming a ciliated edge margining a vertical membranous concavity; seventh ventral very deeply concave, with a broad compressed triangular wing each side, which is directed towards the middle; eighth segment slightly concave.

PIESTIDÆ.

The genera and species of this subfamily now known in our fauna may be recognized by the following tables:

Abdomen broadly margined.....2.
Abdomen with lateral edge rounded, subcylindrical.....3.
Abdomen with lateral edge acute, feebly margined.....ELEUSIS.
2.—Elytra striate and punctured.....SIAGONIUM.
Elytra punctured not striate.....HYPOTELUS.
3.—Tarsi five-jointed, body not costate.....4.
Tarsi three-jointed, prothorax and elytra costate.....GLYPTOMA.
4.—Anterior coxæ contiguous.....ANCÆUS.
Anterior coxæ separated by the prolonged prosternum.....LISPINUS.

SIAGONIUM Kirby.

Rufo-testaceous, head and prothorax finely sparsely punctulate.
1. **americanum.**
Black, head and prothorax not densely but strongly punctured.
2. **punctatum.**

These species inhabit the Atlantic States and have been described under the more recent generic name PROGNATHA Latr.

ELEUSIS Lap.

For the characters of the four species in our collection, see the excellent remarks of Dr. Horn, Trans. Am. Ent. Soc. iii, 279, under the genus *Isomarus*, which as he properly observes is a more recent name.

GLYPTOMA Er.

For the differences between the two species of this genus, see the remarks of Dr. Horn, Trans. Am. Ent. Soc. iii, 332.

ANCÆUS Fauvel.

This genus differs from *Lispinus* chiefly by the front coxæ being contiguous, and not separated by the prosternum. It thus establishes, as already observed by Dr. Sharp, an excellent transition to *Holotrochus* of the Osorii group of Oxytelini.

Black, punctured.....2.
Rufo-testaceous, nearly smooth.....1. **rufescens.**
2.—More strongly and less closely punctured.....2. **prolixus,** n. sp.
More densely and finely punctured.....3. **californicus.**

1. **A. rufescens.** *Lispinus rufesc.* Lec. New Sp Col. 59.

Florida, Alabama, Louisiana.

2. **A. prolixus,** n. sp.—Slender, linear, piceous black, shining, head, prothorax and elytra uniformly deeply but not coarsely punctured. Prothorax a little wider than long, angles nearly rectangular, sides broadly rounded, base broadly but feebly impressed at the hind angles. Elytra a little wider, and one-third longer than the prothorax, sutural stria impressed. Dorsal segments more finely punctured, posterior margins and tip piceous. Beneath piceous, shining, punctulate. Length 4 mm; .16 inch.

New York, one specimen kindly given me by Mr. Ulke. Larger and more slender than the next species.

3. **A. californicus.** *Lispinus cal.* Lec. New Spec. Col. 59.

Middle California, abundant under oak bark. The posterior transverse curved impression of the prothorax is sometimes very feeble. This species greatly resembles in appearance *Holotrochus*.

LISPINUS Er.

Body stouter, more convex, prosternum extremely narrow.....2.
Body slender, depressed, prosternum wider and more prolonged.....3.
2.—Elytra, prothorax and abdomen equally punctured...1. **sequipunctatus.**
Elytra and prothorax distinctly punctured.....2. **obscurus.**
Elytra and prothorax nearly smooth.....3. **tenuis.**

MICROPEPLIDÆ.

But two genera of this subfamily are known, which may be distinguished as follows:

Head, prothorax and elytra costate.....**MICROPEPLUS.**
Body without elevated lines.....**KALISSUS.**

MICROPEPLUS Latr.

The suture and side margin of the elytra are elevated, and in the intermediate space there are four acute costæ, of which the first and second are entire, the third and fourth sometimes abbreviated behind, with the interspace narrower and more elevated; these two costæ sometimes coalesce, so as to form a single ridge, the interspaces are cribrate, punctured or smooth, according to species. Three natural groups are indicated by the form of the prothorax:

I.—Body elongate-oval, prothorax with sides rounded and subserrate, wider than prothorax at base, hind angles slightly obtuse; elytra each with four straight entire dorsal costæ; interspaces coarsely punctured. 1. **laticollis.**

II.—Body oval, less elongate; prothorax with sides angulated, widest in front of the base; hind angles obtuse; elytra with the two outer costæ shorter, interspaces coarsely punctured.....2. **punctatus.**

III.—Body more compact and broader; prothorax with sides bent about the middle, then parallel to the base, hind angles rectangular.

Costæ of elytra sinuous, interspaces cribrate.....3. **cribratus.**

Costæ of elytra straight, interspaces flat, smooth, third and fourth costæ distinct, and a shorter supplementary lateral one, sides of prothorax angulated.....4. **sculptus.**

Similar to *sculptus*, but sides of prothorax oblique, not angulated.

5. **obliquus**, n. sp.

Costæ of elytra straight, interspaces flat, smooth, third costa wanting.

6. **costatus.**

1. **M. laticollis**, Mäklin, Bull. Mosc. 1853, ii, 199.

Alaska; types kindly sent me by Prof. Mäklin and Baron Chaudoir. Found abundantly on the north shore of Lake Superior by Messrs. Hubbard and Schwarz; and in New Hampshire by Mr. E. P. Austin. The prothorax is wider at base in ♂ than ♀, the sides being somewhat curved inwards in the latter.

2. **M. punctatus**, Lec. List of Col. N. Am. 1863, p. 26; *M. costatus* ‖ Mäklin, Bull. Mosc. 1852, ii, 325.

Described from Alaska; two specimens were collected by Mr. Crotch, at San Diego, California, which agree sufficiently with Prof. Mäklin's description.

This species is intermediate in form between the preceding and following. The prothorax is much narrowed in front, with the sides oblique, from the tip to the middle, where they are strongly angulated; they then converge slightly to the base, and have a small tooth half way between the side angle and the base; the basal angles are obtuse in outline, but acutely cuspidate at tip.

The third costa of the elytra is abbreviated behind, and widely separated from the fourth.

3. **M. cribratus**, Lec. New Spec. Col. 60.

Georgia, one specimen. Easily known by the irregularly flexed and sinuous costæ of the elytra, and the very coarsely cribrate interspaces. The sides of the prothorax are oblique in front, strongly angulated at the middle, then parallel, with a small cusp half way between the side angle and the basal angle, which is rectangular, and not rounded.

4. **M. sculptus**, Lec. New Spec. Col. 60.

One specimen, Georgia. Without close examination this and the next species might be confounded with *M. costatus*, on account of the elytral interspaces being wide and nearly smooth, on comparison however, it will be seen that the ridges are not so acute, the usual third costa is present, and abbreviated behind; the fourth is entire; on the

inflexed part of the elytra there is a curved costa parallel with and approximate to the margin, but in the interspace between it and the fourth costa there is an acute costa abbreviated, both before and behind. The sides of the prothorax are oblique in front, obtusely angulated at the middle, then parallel and undulated nearly to the basal angle which is slightly obtuse and rounded.

5. **M. obliquus,** n. sp.—Blackish-brown, head and prothorax subopake, elytra and abdomen shining; of the same form and size as *M. sculptus.* Head with two oblique ridges and the side margin elevated. Prothorax nearly three times wider than long, widest at base, narrowed and slightly rounded on the sides to the tip, slightly repand, but not angulated; disc divided into cells as usual, but the flattened sides are less uneven than in *M. sculptus.* Elytra costate precisely as in that species, each with four dorsal costæ, and a curved one on the inflexed side margin; in the interspace between this lateral one and the fourth dorsal is an acute costa abbreviated before and behind, interspaces wide, smooth. Penultimate dorsal segment of the abdomen impressed as usual. Length 1.4 mm; .05 inch.

British Columbia, one specimen. The differences between this and the preceding may be merely sexual, but in the absence of other specimens, I am hardly warranted in considering specimens from such distant localities as pertaining to the same species.

6. **M. costatus,** Lec. Agassiz, Lake Superior, 221; *M. costipennis* Mäklin, Bull. Mosc. 1853. ii, 200.

Lake Superior; California, (at Gilroy); Alaska; a typical specimen was kindly sent by Prof. Mäklin. The interspaces of the elytra are smooth, or nearly so, and very wide; the usual third costa is wanting, and the fourth is entire; on the inflexed side of the elytra there is also an entire costa, which is curved and parallel with the margin. The sides of the thorax are oblique in front, feebly angulated at the middle, then parallel nearly to the base, where they are slightly inflexed, causing the basal angles to become somewhat obtuse, and slightly rounded. This species differs from all the others in having the penultimate dorsal segment not carinate or impressed, thus exhibiting a passage to the next genus.

7. **M. brunneus,** Mäklin, Bull. Mosc. 1852, ii, 326.

Alaska. Unknown to me.

KALISSUS Lec.

1. **K. nitidus,** Lec. Trans. Am. Ent. Soc. V, 50.

Vancouver's Island, one specimen collected by Mr. G. R. Crotch.

MOUND-MAKING ANTS OF THE ALLEGHENIES, their Architecture and Habits.

BY REV. HENRY C. MCCOOK.

In the summer of 1876 I arranged to make a study of the Wood or Fallow Ants (*Formica rufa*), whose "hills" are familiar to all dwellers and visitors among the mountains of Pennsylvania. The experience of brief observations during previous years had satisfied me that it would be necessary to spend several days and nights on the home field of these interesting mound-builders of the insect world, and observe their habits continuously. Accordingly on Tuesday, August 15th, I pitched tent in a grove on the western slope of Brush mountain, about one mile northeast of the beautiful city of Hollidaysburg. My companion was James W. Riddle, Esq., of Bell's Mills, whose generous hospitality and practical aid I have great pleasure in acknowledging. John Smidt our cook and factotum was an intelligent Bavarian who had served in the late Franco-German war. A convenient and pleasant camping ground was found near "Big Pine Spring," where we established ourselves and spent a week very comfortably. My time was wholly given during this period to the investigations, whose results are given below. For the sake of convenience the name which I gave to the locality, viz.: "Camp Riddle" will be retained in the notes.

Number of Hills.—The field in which we were encamped is the property of the Cambria Coal and Iron Company, and is on the southwest base of Brush mountain. About fifty acres are occupied by the ants. At least three-fourths of this land is covered with an open wood, consisting chiefly of black and white oak, with a few pine, maple, dogwood and hickory trees. The soil is sandy, and is literally filled with the flat reddish-brown quartzoze sandstones which compose the surface bulk of this mountain. Many of the ant hills are surrounded by a belt of these stones one to two feet wide, which are quite bare. The soil has of course been transferred from beneath them to the hills, although their peculiar appearance suggests the idea of having been thrown out of a cellar or pit by a human laborer and ranged around the margin. The number of mounds in this "ant city," as it is called by many of the citizens of these parts, is about 1700. An actual count was made of 1300, not numerating the embryo

hills, the remainder being estimated. One acre contained 33 hills, another 25, a fair average (29), of the distribution over the field. Through the kindness of Mr. Edgar B. Kay,* a young gentleman in attendance upon the Mountain Seminary at Birmingham, this may be compared with the distribution at two other points in the north-eastern end of this (Blair) County. At Warrior's Mark one section of 2 acres contained 55 hills; another section of 2¼ acres contained 74 hills. This gives an average distribution of about 30 to the acre. In the second section, however, 20 hills were abandoned, and covered with moss and grass. At Pine Hill the ant colony is quite as extensive as that at Camp Riddle, and the hills even more thickly placed. About 30 acres are occupied, of which 5 were carefully surveyed and found to contain 293 hills, an average distribution of 59 to the acre. The whole colony was estimated to number about 1800 hills, quite evenly distributed over the section.

Colonies.—The fact that these mounds are found commonly if not always in Colonies attracted my attention; but I was not able to find any reason for it, beyond the conjecture that the unequal distribution of farms along the mountains has left certain sections, undisturbed by the plough and the ordinary discomforts of civilization, to these children of nature. It is probable, as suggested to me by Judge Caldwell, a citizen of Hollidaysburg, that the ants follow the sand belt† and keep for the most part to the mountain sides. The colony at Camp Riddle is quite near the foot of Brush mountain, most of the mounds being upon the slopes. A series of ridges and hills runs between Brush and Tussey mountains from the lower end of Sinking Valley beyond Warrior's Mark, along which the ant-mounds appear to be scattered. They are placed on the western and northern faces of

* Mr. Kay undertook and most intelligently conducted a series of observations upon points which I furnished him. The references in this paper to all observations made at Warrior's Mark and Pine Hill are from his notes.

† From the same gentleman I learned that the Brush mountain is a spur of the Cove mountain. Cove mountain is a long range of mountains extending from the northern part of Pennsylvania, southward through Virginia, having various names in different sections. Both sides of Brush mountain correspond in geological characteristics with the western side of Cove mountain; which differs much from the eastern side. On the West is found the sand rock; on the East instead of the sand rock is found slate. I will be obliged to those to whom these lines may come for any information in their possession which will aid in determining the distribution of these ants throughout this State and other States; and also whether they confine their colonies to the sand belt.

the ridges, scarcely any being found on the other sides except where the ridges are broken, and on small knolls. The soil in these ridges is sandy. The farmers near Warrior's Mark have the opinion that the number of mounds is less than many years ago, and that they are now more generally arranged in Colonies than formerly. An old settler at Pine Hill had the same opinion, although the lack of positiveness in the matter would seem to indicate no very notable decrease in the size of the Colonies. The same person declared that here also there are scarcely any mounds on the eastern and southern sides of the ridges. The causes which influence these little builders in the choice of a site for their republics are well worth further attention.

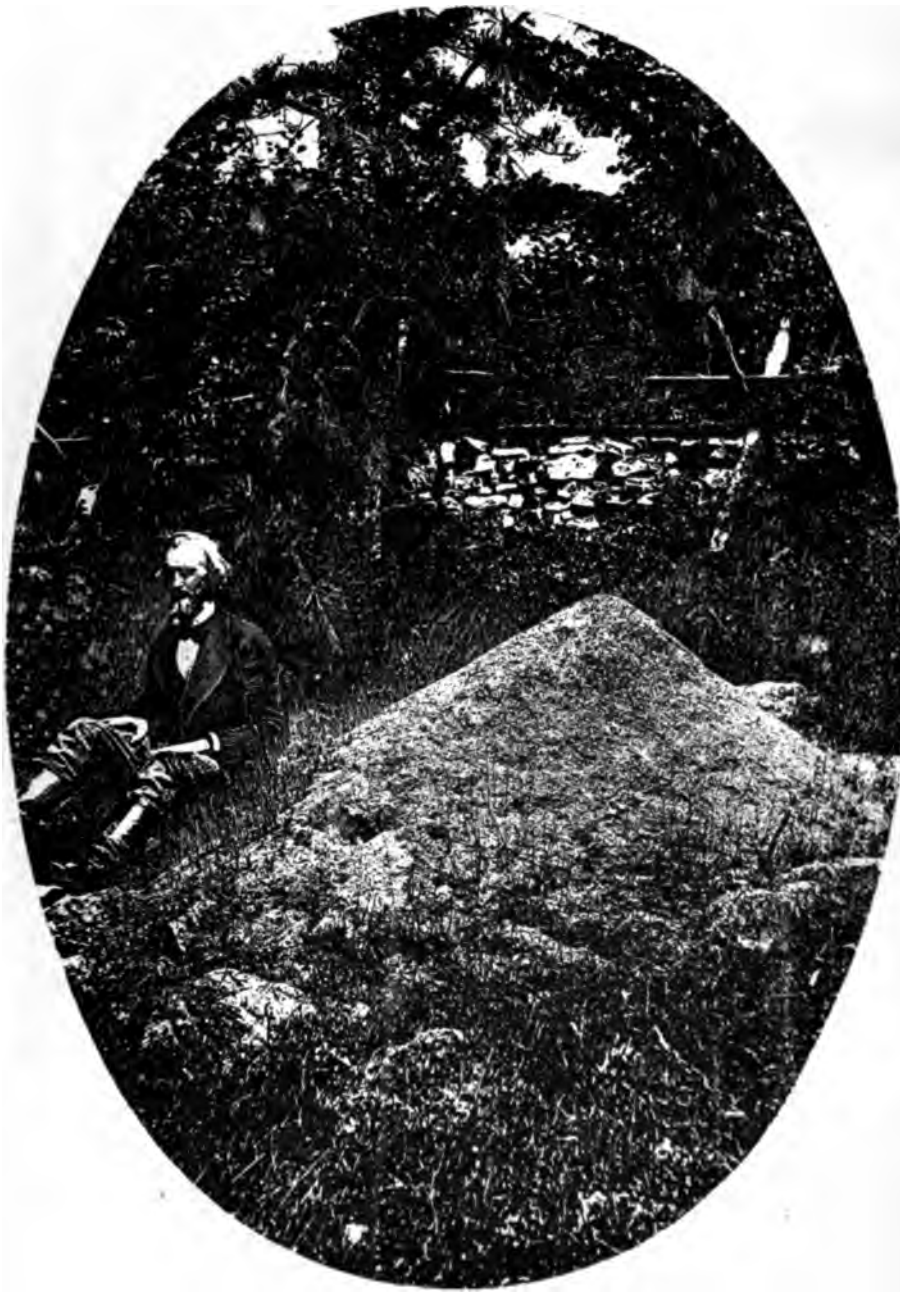
Size of Hills.—The ant hills are cones of greater or less regularity, the most common size of which is from 10 to 12 feet in circumference at the base, and from 2½ to 3 feet in height. But every size may be found, from the large mounds whose measurements are given below, to the mere embryo hill which is but a handfull of dirt around the door of a ground gallery. The hills represented in the Plates measured as follows: Pl. II, single large hill; circumference at base, 25 ft.; west face, 6 ft. 9 in.; east face, 3 ft. 6 in.; south face, 4 ft. 4 in.; north face, 4 ft. 3 in. The distance along the hill over the summit was thus 10 ft. 3 in.; across it, 8 ft. 7 in. Pl. IV, large hill, perpendicular height 32 in. Pl. V, upper hill, perpendicular height 24 in.; along the base through the centre 7 ft. 6 in. Lower hill, perpendicular height 26 in.; base line or diameter 6 ft. Pl. VI, double hill, western face, 6 ft.; eastern, 3 ft. 6 in.; between the summits 5 ft. 3 in.; total measurement along the top, 14 ft. 9 in.; perpendicular height 27 in.

Largest Hill.—At Warrior's Mark and Pine Hill some of the mounds are larger than the above. One conical hill measured 12 feet across the top and 30 feet in circumference; another 15 feet across the top and 37 feet in circumference. Two double hills measured, one 15 feet (lengthways), along the top and 47 feet around the base; the other along the top 24 feet, around the base 58 feet, and in height was about 42 inches. This last is the largest observed; it was built on an old charcoal hearth which was quite level. These double hills, illustrated at Pl. V, are of frequent occurrence; they appear to be the natural blending of two hills located so near to each other that they necessarily unite when enlarged. The inhabitants seemed to be one family, working together harmoniously as in single hills. The large

double hill at Warrior's Mark, (19 by 47 feet), presented a peculiarity which I have observed in several other hills. On the northern face it was almost entirely deserted. The rains had washed off the outside covering or roof, exposing the inside structure. This part of the hill was abandoned by the ants, with the exception of occasional stragglers; but on the other sides the insects swarmed, and on the western, southern and northeastern faces the work of construction was progressing rapidly.

Abandoned Hills.—At Camp Riddle the number of hills wholly abandoned was quite small; at Warrior's Mark fully one-fourth of the whole number reported were uninhabited. Many a romance of ant life lies hidden within those silent moss-covered mounds. Could one uncover those lost pages of natural history he would doubtless unfold a tale which would sufficiently account for such wholesale and apparently unreasonable migrations. There would appear "moving accidents by flood and field," such as fierce showers and flooded grounds, inroads of neighboring clans pressing siege and waging battle, with the attendant loss of life, treasure and home. Stray cattle, swine, mischievous boys and perhaps foraging bears would render "perils in the imminent deadly *breach*." Besides all these good and sufficient reasons for abandoning old quarters that have become uncomfortable, no doubt ants have their whims and fancies, and probably like their human fellow-workers sometimes "change the place and keep the pains," or even fall upon a worse estate. I have thought that some of these abandoned hills have been reoccupied as they carry a moss grown and ancient appearance, although in full activity. Very much is yet to be learned of the local migrations of these communities, which might give a clue to other unknown habits. But the study requires an observer within easy reach at all seasons of the year.

Family Groups.—We turn our attention now to the growth and structure of the ant hills. Pl. III is a view of a group of eleven mounds, seven of which are represented in the photograph. They are of various sizes, and as will readily be seen are grouped around a central mound, which may be called the mother hill from which they have evidently grown. The same tendency to cast off "shoots," and form a hill cluster or family, is shown in the hill figured at Pl. II. This large hill is surrounded by six others at distances varying from 4 to 15 feet. Pl. IV exhibits the same feature, the two small hills on either side being growths from the large central mound. All these secondary hills were small, from 4 to 6 feet in circumference at the



J. Sinclair & Son, Lith. Phila.

Hill of [illegible] Panna.

Formica rufa, Hill-cluster or Family Group.

E. pilatasection views.

F. rufa, Twin Hills, view of galleries.

F. rufa. Double Hill, section view.

base. Pl. V again shows the development of two hills of nearly equal size side by side. The same feature is shown at Pl. VI, although in that group the hills have blended.

All this shows a fixed habit in the growth of the hills. As the community increases, new cones are begun, the opening of some gallery perhaps being taken as the centre of operations. I have frequently observed these embryo hills. The commencement of a hill sometimes depends upon the location of the feeding ground. Eight rods from the large hill in Pl. II is an oak tree, which was covered with aphides, and upon which the inhabitants of that republic have established a permanent foraging ground. About a foot from the base of the tree an embryo hill has been begun by a portion of these workers. I observed them closely and have no hesitation in identifying them as of the one family. A number of hills, some of them of goodly size, which are built up against the trunks of trees, have evidently been formed in the same way. Indeed it is highly probable, from observations hereafter recorded, that most if not all the hills have similar connection with the trees which furnish the feeding grounds, by underground galleries.

What influence the annual flitting of the males and females, and the chance settlement of the latter after fertilization, may have upon the formation of new hills, I am not able to say, as I have not been so fortunate as to witness a swarming. Some of the fruitful females, it is known, are seized by the workers upon the mounds and others upon the neighboring grass stalks and weeds, and are thence forced into the hill. But there must be some who drop upon secluded spots, and unobserved, begin measures for the establishment of new families, according to their instinct. These families eventually erect independent hills, which in turn become the mother hills of new hill-clusters. Thus ant colonies, like some groves and forests, grow from the parent stock by "shoots." In some cases, it may be added, there is a small abandoned moss covered mound which seems to have been the original capitol of the republic. But like many a now deserted and grass grown village of human inhabitants, formerly the seat of flourishing and active traffic, the tide of fortune has swept away from the once thronged galleries, and busy communities in vastly increased proportions, have sprung up around the original settlement.

Building Materials.—The materials composing an ant hill are various, although the sandy soil forms well-nigh the entire bulk thereof. This soil, so far as I observed, is always brought from the interior of

the mound, through which it must have been carried from the galleries beneath the surface. Besides this, bits of decayed wood, the needle-like leaves of the pine, pieces of grass, and leaves of shrubs are intermixed with the earth. The soft particles of wood, small and freshly cut, were often found distributed during the night over the surface of hills which had been free from them the day before. There was a similar covering up of the summits of hills with bits of straw which seemed to have been taken from the tufts of grass growing out of the base. I have seen ants upon the grass, as though at work, but have never witnessed the actual severing of the stalk. There can be no doubt however of the fact that these straws are collected (if not cut off), and arranged upon the mounds.

Cutting off Foliage.—That the insects do cut off foliage for such uses may be considered as established by the following fact. A hill kept under constant observation was found covered one morning with the black decayed leaves of a wild indigo plant (Baptisea tinconia), which grew within two feet. The upper part of the shrub had been broken partly off, probably by one of our party, and was bent over towards the mound. The leaves upon this portion were black, upon the rest of the plant green. The black leaves upon the hill had therefore been cut off from the bruised top, carried to the cone and distributed over two or three square feet of the surface quite thickly. A very great number of these leaves had thus been disposed of. In cutting into the hills, however, I do not remember to have found any traces of this surface litter, so completely had it decomposed. I observed it afterwards being covered up; but the query was raised in my mind, is not its chief use to form an external protection or blanketing against the weather? Several of the hills opened showed stones from the size of a man's fist to the size of his head imbedded in the heart of the cone, and raised one or two feet above the ground surface. One such stone is shown in the lower mound Pl. V, and another in the angle of the sections at Pl. VI. These stones were probably the remains of bombardments by truant boys, and had simply been covered over by the patient workers and the hill built up above them.

Architecture.—What are the methods (and principles shall I say?) of architecture, by which the Fallow ant prosecutes her immense labors? This was a question which deeply interested my mind. But for the first four days of our stay in camp nothing new or satisfactory presented. The weather was warm and dry, giving no signs of a change. There was little doing in the line of improving the real

estate of the colony. Here and there a hill was being covered over with fresh pellets of soil, which the ants were bringing from the interior, and scattering equally over the surface. This showed that the work of enlarging the galleries, perhaps the underground galleries, was being pushed forward. But this was all. Artificial showers, produced with wisps of grass, failed to create any architectural activity. However, the evening of Friday (Aug. 18), proved a happy exception to the traditional ill omened character of the day, for it brought to our ant city a heavy, protracted shower. From 9 to 10 o'clock P. M., I was out with lantern and umbrella to note the effect upon the ants of the rain, which was then comparatively light. The insects were working much as usual. They crowded in columns along the avenues; they thronged the trees-paths, and covered the feeding-grounds collecting honey-dew from the aphides; they wrought quietly upon the hills. At 4 A. M., at the severest period of the storm, when the rain was falling very heavily, I again went the rounds of the hills, some 8 or 10, which I had marked for close, continuous observation. Matters were very much as before, the ants appearing to be scarcely disturbed.

After daylight, the scene presented was an exceedingly lively and interesting one. The utmost activity prevailed on every hill, and the whole architectural habits of the little builders were uncovered to observation. These may readily be seen by reference to the following figures. The drawings were made upon the ground and are transferred from my note book without change in order to secure entire accuracy in architectural plan and detail. Figures 1 and 2 were drawn from work done upon a small hill which had been cut across the top in order to study the construction of the galleries. On the day before the shower one-half the cone was left standing, the broken cells and clay cleared away and thrown to one side. The work of restoring the ruined half began immediately upon the former foundation. The pellets used upon the works were for the most part brought from within. Squads of workers were continually thrusting their heads out of the galleries opening upon the perpendicular face of the remaining half-cone, and dropping down pellets. These were taken up by squads below and wrought into the galleries and halls represented in the cuts. I remained for a whole day before this and another hill, observing when accuracy required, with a magnifier, which I was able to do without disturbing the busy little architects. The method of observation was to note each step made, changing the

sketch as the work advanced, recording at the same time the changes. Thus my outline grew upon the paper as the work grew upon the ground.

Building Galleries.—Fig. 1 represents a covered way or gallery 6 inches long, which started on the foundation 3 or 4 inches below the surface of the field, and ran up toward the half-cone at an angle a little less than 45°. When first seen it was an open gallery or ditch, and was observed until it was entirely covered over except one door or round hole near the top. The work progressed by the continuous addition of the earth pellets to the outer edge. The pellets

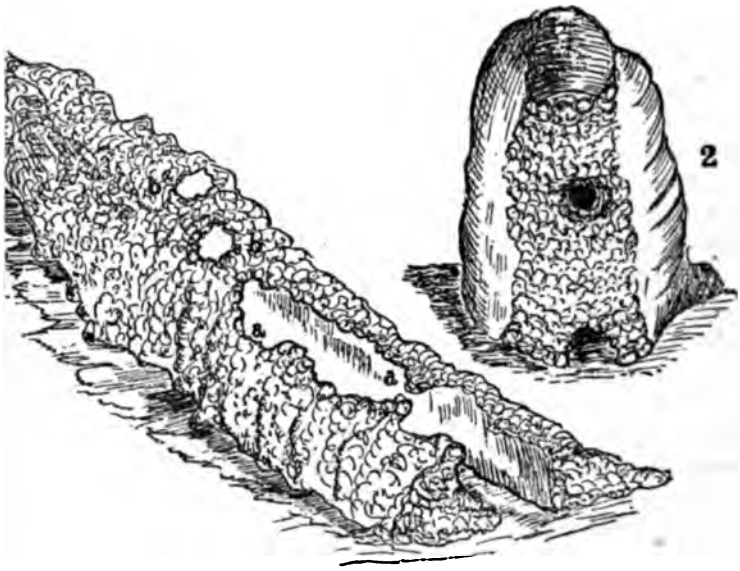


FIG. 1.—Covering Galleries. (1), horizontal gallery; (2), vertical gallery.

were carried in the mandibles of the ants, and were usually pressed into position. The springing of the arch was plainly seen, the two sides slowly approaching each other in irregular lines as shown at *a*, *a*. Gradually two points drew near and nearer, until they well-nigh touched. It was quite exciting to watch now the delicate manipulation of the architects. Here comes a worker with pellet of larger size; she climbs the arch, reaches over, holding the while by her hind feet, and drops the ball of soil into the breach. The bridge is made. And now with surprising rapidity it is widened until the roof of the arch assumes the appearance indicated at *b*, *b*. Circular openings

or doors are habitually left in the work, through which the ants are moving back and forth, apparently working upon the inside to strengthen the arch. As sections of the building are completed these doors are closed, so that they are plainly but temporary arrangements for the convenience of the masons.

On other parts of the foundation similar structures were going up. At 2, Fig. 1 was a section of a vertical column, one side of which had been cut away. It was two inches high, one inch across. The ants were working upon this in the same manner as described above. They built not only from the bottom up, but from the side across. The central opening in the figure was finally closed, leaving, when the work ended, the opening at the foot of the column. The circular gallery thus enclosed was one-half inch in diameter, which is about the usual dimensions. The work of construction was not confined to the space which, as in the above cases, was the original site of the cone. Having occasion to lift up a fragment half the size of one's head, which had been thrown to one side, I saw that the section had already been made the nucleus of a new mound. Columns, corridors and halls, corresponding closely with those outlined upon the under face of the fragment, had been erected, which were thus quite united to the fragment. In one of the halls was a small collection of dead ants. The greater portion of one day was spent in studying and recording the work upon this one hill. Other drawings were made from different positions, but the method and result were the same. As the activity occasioned by the shower continued for the remainder of our stay, I had full opportunity by subsequent observations to verify my notes.

Fig. 2 is another example of architecture drawn from the same broken hill. The figure represents a double gallery which was built up against the perpendicular side H of a hole cut by the spade in removing the cone. The gallery a, a, a, was carried along the base of the side 3 inches, and then upwards toward the surface. The gallery was widened at two points c, c, to 1½ inches, as though intended to serve as store-rooms for cocoons. Galleries opening downward communicated with these enlargements. At e ants were arranging pellets along a projection on the side, for what purpose was not apparent.

My attention was next directed to the large hill Pl. II, which with its surrounding hill-cluster was on my regular "list." I took this plan of keeping several hills under regular, daily, and indeed for

much of the time hourly observation, for the obvious reason that thus I could become "acquainted" with the workers, could trace the work done, and confirm or condemn previous conclusions as the case might be. In this hill a track had been made by one of a herd of cattle grazing in the field. The foot of the steer had left an irregular depression, measuring 9 inches each way, in depth 8 to 9 inches, the lower margin being 6 inches from the base of the hill.

Engineering.—The lower part of this track is shown at Fig. 3, in order to exhibit what seems very much like a deliberate and well planned system of engineering, in filling up the hole. The drawing

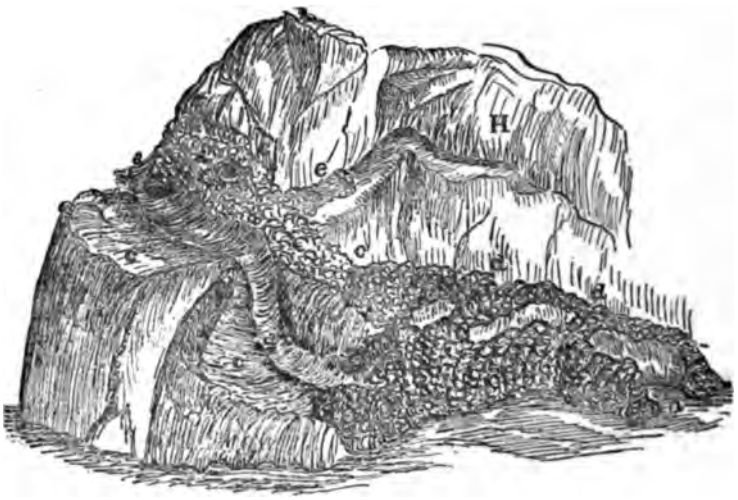


FIG. 2.—Covering a double gallery *a*, *a*, *a*, and chambers, *c*, *c*, *c*.

is one-half natural size. At *A*, *a*, the original hill is shown, marking the southern limit of the foot-print. The work of filling up against this had begun. From the lower point *A*, marking the outline of an arc, were the following works: *b*, a circular column 1 inch high, from the upper base of which, a broad bifurcated plateau was being extended; next to this was an oblong mound *c*, ½ inch high, and beyond that, marking the opposite limit of the track, a lunette *d*, 1 inch high. Beyond this, toward the base of the hill, and parallel with the arc *b*, *c*, *d*, was thrown an arc of like but smaller lunettes *i*, *i*, *i*. At *e* and *f*, were lunettes similar to *d*, and at *g*, a scolloped mound. These elevations, with that at *k*, *k*, surrounded the cavern *h*, which was the deepest part of the cattle-track. The plan of opera-

tions is very plain; from the little raised columns and mounds figured above, the work of covering in could proceed with the greatest advantage. The elevations *b*, *c*, *d*, were evidently guaged by the height of the edge of the hill at *A*, thus marking the depth of the track on that line. The diminishing depth was met by a corresponding lowering of the lunettes *i*, *i*, *i*, and at other points in the excavation the same facts held good.

The above operations began on Saturday morning; on Monday morning the cavity was two-thirds filled. Very strangely the work did not connect with the face of the break towards the summit of

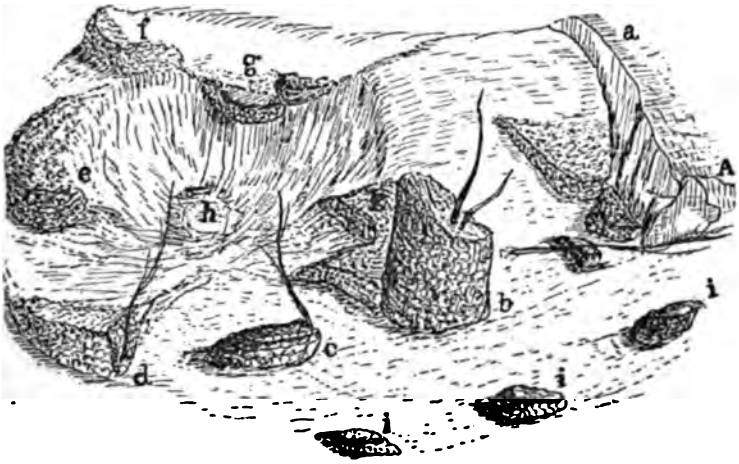


FIG. 3.—Engineering work; filling up a break.

the hill, but a deep trench or gallery had been preserved all the way across, the wall being maintained intact. The photograph was taken on this day, and the track with this trench may be seen in the plate. Nor was there any appearance here of the formation of the galleries above described; it was dead filling in. In one of the little hollows the shells of cocoons, out of which antlings had just been delivered, were piled up, apparently to assist in the filling. I had before observed these being carried from this hill and deposited on the stones outside. A number of straws were worked into the columns, evidently as braces. A few feet from this large mound was a small hill, one of its off shoots, which even before the rain had shown much activity in construction, for the surface was covered with fresh pellets. The shower had inspired the inmates of this young community with amazing zeal.

Adding Stories.—On the east and west sides of the hill several inches from the top, deep fissures had been cut, looking like sun cracks, the lower edges of which were being built up, and the upper bent over. An additional story was thus being added to the cone. Here grass-straws were strewn over the summit, and others which I threw upon the hill were dragged into place and utilized with skill. This story was well nigh completed by Monday morning. The building was carried forward (and such was the case on the large hill and on others observed), by erecting warts or small cones upon the surface and around the openings or doors of the galleries, and filling between them. I could trace evidently the outlines of galleries laid out.

Pellets.—The question arose, especially in view of such operations as the covered gallery at Fig. 1, by what means are the pellets of earth, used in building, caused to adhere to each other? The fact is beyond question in my mind that the ants proceed with intelligent purpose, directed by experience, to spring the arches of galleries and lay out and conduct other building operations. But I was anxious to know whether the pellets were fixed in their appointed places by "mortar" formed from the natural moisture in the soil, or by some secretion from the ant. I feel well assured from the facts above recorded and kindred observations, that the moisture of rain is necessary for the work of construction. The galleries were being enlarged during the dry weather, and the pellets thrown out in large quantities upon several hills; but there was no effort to erect them into stories and galleries for enlarging the hills. The heavy shower was the signal for such work to begin, and it went on energetically and continuously throughout the succeeding period of our stay, during which the effects of the shower upon the earth were apparent. This would seem to indicate that if there be any secretion from the mouth organs of the insect (which I do not think probable), it is insufficient to procure the adhesion of the pellets. A highly suggestive remark was offered by Prof. Köenig, in connection with a verbal communication made to the Academy of Natural Sciences, Philadelphia, of some of the above facts, viz.: that formic acid which is so abundantly extruded by these ants, forms with the silica of the soil a natural cement. Can it be, that these pellets which are composed largely of sand, are thus cemented together? At least, one who may have the opportunity to make observations similar to these here recorded, should pay particular atten-

tion to the use made by the builders while laying the pellets, of their abdomens from which the acid is secreted.

The thought occurred to me that the conformation of the pellets themselves might greatly aid their mutual adhesiveness. A number were therefore submitted to close examination. The figures at Fig. 4 are magnified drawings of a few of these forms. They evidently are each accumulations of small particles of soil, united in various irregular shapes, by the pressure of the mandibles. Some of them present the appearance of being cut down from larger masses, or cut away upon the face. This may simply be the natural result of manipulation under that toothed organ which serves the ant as trowel, chisel, spade, hammer and hand. Whether or no these pellets be wrought into their peculiar shapes with deliberate and intelligent purpose; or, are only an accident of their preparation or handling, it is obvious that their form must greatly facilitate the work of the ant in fastening them together. The irregular faces of the pellets fit into and fasten upon each other, uniting the whole in a way which may not indeed be properly characterized by the terms "dovetailing," and "ball and socket" jointing, but which nevertheless gives one a rude impression of such mechanical contrivance.

After having expressed the above opinion in the Academy, I submitted some of the pellets to Dr. Joseph Leidy for observation under the microscope. He gave me the following opinion: "The pellets, examined by the microscope appear to be composed of several small rounded or ovoidel balls cemented together by the same material. I could detect no special mechanism like facets or 'ball and socket' jointing." This was accompanied by a figure of a representative pellet which is marked *L* in the group. It will be seen at a glance that it does furnish a rude socket into which the projections upon other pellets might readily fit.

FIG. 4.—Group of pellets of soil used in architecture.

Age of Hills.—What is the age of these hills? or more properly speaking, How long does it take a community to erect hills of such sizes as are here represented? There are various conditions which must cause a necessary variation in the progress of the work at different times and places. The condition of the season as to moisture, the nature of the soil, the inroads of enemies, the size and necessities of the community, and other contingencies must make a difference

between the growth of the hills as compared with each other, and in the growth of the same hill at different periods. It seemed possible however to make a rough estimate of the rate of progress. Adjoining the wood in which the ant city is located is a field owned by a Mr. Prough, a farmer long resident in the neighborhood. Several hills had sprung up in this field, since the last crop had been taken from it. This seemed to promise the data for calculation. The field had been plowed in September, 1875. The following measurements were made by Mr. Prough and Mr. John McGinnis, February, 1877, viz.: Hill No. 1, 8 ft. 9 in. around the base, 10 in. high, 2 ft. 11 in. in diameter. Hill No. 2, 11 ft. 4 in. around the base, 14 in. high. 4 ft. in diameter. Also, in a corn field plowed July, 1876, two hills were measured, each of which had the following dimensions: Nos. 3, 4½ ft. around the base, 8 in. high, 1 ft. 6 in. in diameter. Nos. 1 and 2 are the result of but a little more than one year's work. viz.: from September, 1875, to November, 1876, at or before which time the frost stops all work. Nos. 3 exhibit the result of about two months active labor, one-third of the working season. The amount of work done may be thus calculated (roundly); in No. 1, 1¼ cu. ft. per year; No. 2, 3 cu. ft. per year; Nos. 3, each 1 cu. ft. per year.

Hill No. 2 exhibits the most remarkable increase, having attained more than half the average size of the mature hills (if I may use that expression), in little more than a year. It may be that this was simply the re-erection of a hill that had been ploughed over, and of course went on more rapidly as a large community at once centered all efforts upon the work. Nos. 3 seem to be examples of growth on the part of new communities. Making allowance for the varying progress occasioned by varying communal exigencies, we may estimate the time required to complete a mature hill to be from five to seven years. After that the activity of the workers finds employment in the construction of new mounds.

I had hoped with the above data of annual growths, and the dimensions of a number of hills, to obtain by a simple calculation and with reasonable accuracy, the age of any hill. But I am compelled to abandon this hope by the fact that the largest mound reported at Pine Hill, the largest of which I have knowledge, having a cubic contents of about 300 cu. ft., is built upon an old charcoal hearth. It is therefore of quite recent date. The upbuilding of such a cone within so limited a period indicates an immense capacity for accomplishing work under certain favorable conditions. While the above

facts fail accurately to satisfy the inquiry as to the age of the hills, they are interesting as showing to some extent this capacity for work. I have good reason to believe that some of the hills are at least thirty years old. They probably do not grow after having reached a certain bulk.

Building by Compass.—One other point in the architecture of the hills engaged my attention. The mounds were observed very generally to have the longest face of the cone toward the west. Is this merely the result of gravity and the wash of the rains, since the mountain slopes toward the west? Or, is it a characteristic habit of the hill, fixed by the purpose of the ant? I was led into this inquiry by Huber's statement concerning the Yellow ants (Formica flava), of the Alps. Their habitations there take an oblong and almost regular shape. They lie in a direction east and west. Their summit and the greatest slope always faces the east; but they incline also on the opposite side. This peculiarity, which was verified upon thousands of ant hills is not preserved in the plains, probably because of exposure to derangement by men and the lower animals.

Huber's description of the position of the yellow ant hills corresponds with the fallow ant hills at Camp Riddle, except that the position of the greatest slope is reversed; *i. e.*, it is toward the west instead of the east By the greatest slope I mean the longest slope, as I suppose Mr. Huber also means. Of a large number of hills examined and recorded by myself, 94 per cent. had the long slope westward, the steepest slope eastward. Of the remainder, more than half had the long slope toward the southwest. To determine, if possible, whether a change in their general form would follow a change in the slope of the land, I noted particularly the position of a few hills upon a ravine in the face of the mountain whose sides sloped nearly north and south; also of those upon level ground, and of hills built upon the sides of a deep cutting made by ore miners for purposes of drainage. The result left my mind in doubt. Several cases were noted in which the general tendency had plainly prevailed over such influence as a different slope and gravity might have exerted. On the other hand some hills were found the longest slopes of which appeared to be carried from the general direction by a corresponding slope of the land * The impression left upon my mind is that the habit of the

* Extract from note book; "1 hill clearly determined by the slope of the gully to face (longest slope), N. W. 2 hills long slope S. W. with tendency to W.; apparent struggle to face W., in one case nearly successful. 1 hill S. E. appa-

hill is to present the steepest slope to the east, the longest slope to the west; in other words, that the ants habitually build their mounds with respect to the points of the compass, the variations being due to opposing circumstances.

In order if possible to settle this question, I requested Mr. Kay to bear it particularly in mind in his observations at Warrior's Mark and Pine Hill. He reported the results as follows:

Section 1. The surface sloping west.

Number of hills with long slope			North	0
"	"	"	South	4
"	"	"	East	3
"	"	"	West	46
"	"	conical		20
"	"	facing East and West		1
Total				74

Section 2. Surface sloping north at an angle of about 20° depression in one part, and about 10° depression in another.

Number of hills, longest slope			North	10
"	"	"	South	3
"	"	"	East	8
"	"	"	West	24
"	"	conical		10
Total				55

Section 3. Surface sloping northwest and west.

Number of hills, longest slope			North	17
"	"	"	South	9
"	"	"	East	17
"	"	"	West	198
"	"	conical		52
Total				293

The percentage of hills facing in the general direction, as compared with the others may thus be presented in one view.

	Long slope W.	E.	N.	conical.
Section 1, slope W.	.62	—	—	.27
Section 2, slope N.	.436	—	.18	.18
Section 3, slope N. W. and N.	.675	.06	.06	.174

It will be observed that in Section 2, where the land slopes north, the general habit of the hill prevails, but the slope of the land has

rently determined by a declivity. 1 hill E. apparently might as well have faced W. 2 hills on a sharp E. slope of cutting looking with long slope W. in spite of gravity. 1 hill on E. slope of gully, with long face W."

exercised an evident diversion, influencing 18 per cent. of the hills to present the longest slope to the north. In Section 3, with the prevailing slope of land toward the northwest, the north gains but a small per cent. of the long slopes of the hill. On the whole, the above exhibit strengthens the impression made upon my mind that the ants have some regard to the points of the compass in building their mounds, although there is certainly nothing like the regularity that Huber attributes to the Swiss yellow ant hills, which makes them a safe compass to the mountaineers in foggy weather.*

Galleries.—Much attention was given to the structure and extent of the galleries. The mode of erecting them above ground has already been fully illustrated. I had half sections of a number of hills sawed down and cut away in order to study the arrangement of the galleries; and to obtain accurate figures for comparison and more favorable study, I had a few of these section views photographed. Some of the hills were cut east and west, some north and south, others at random. I found that quite generally the greatest regularity in the direction of the galleries was north and south, although one hill showed equal regularity east and west. This fact may be observed by examining carefully the two hills of Pl. IV, the lower one of which is cut north and south, the upper east and west. The double hill at Pl. V will illustrate the same feature. The lower hill is cut east and west and a quarter section taken from the upper one thus exposing in one view the result of both the north and south, and east and west cutting. The tendency of the galleries is to cross the hills at right lines. They have the appearance of being laid regularly one above the other. This feature may be noted most satisfactorily in Pl. IV, lower hill, in the shaded portion of the perpendicular section, at the right and toward the base of the cone. The openings of the galleries were carefully cleansed of soil, so that they might present as natural an appearance as possible before they were photographed. Nevertheless, much to my regret, the plates fail to show perfectly the peculiar structure of the interior of the hill. A tolerably accurate knowledge, however, can be formed from the plates.

Underground Galleries.—Thus far we have been dealing with

* I had intended to withhold the observations bearing upon this interesting point, (and indeed other details herein recorded), until further investigation should lead to some definite conclusion. But, in the hope of stimulating some one nearer the field to take up the inquiry, and influenced by the publicly expressed wishes of several eminent naturalists for all the information to be had concerning the habits of ants, I have thought it better to submit my notes even at the risk of burdening this paper with matter that may be valueless.

that part of the formicary which is above ground and is apparently the most considerable. There is however a hidden portion which is immense in extent, and must have vast importance in the economy of the community. Every hill furnishes a fair measure of the extent of the underground system of galleries connected therewith; for it is reasonably certain that the entire bulk of soil in each mound has been excavated and brought up from the galleries beneath the surface. The average width of the upper galleries is about three-eighths of an inch; the maximum width not exceeding one-half inch. The underground galleries are probably of the same size. A glance at these mounds, therefore, at once gives indication that an extraordinary system of subterraneous galleries must be connected with each formicary. I made no satisfactory examination into the arrangement of this system; this might have been done, perhaps, by sinking a deep trench close to a mound and extending it for some distance. But the soil is so very full of stones that even thus the results might not be satisfactory. No doubt the ants descend to considerable depths utilizing the stones in various ways, for example for roofs and walls, as they do upon the surface. It would hardly seem possible to preserve any great regularity in the course of these underground ways which must constantly be diverted by the stones. But they undoubtedly can be held to a general course, and are carried with great directness from point to point when it is desired to communicate with the trees and feeding places. I was able in one case to trace the extent of the galleries near the surface in the following way. Tapping upon a hill whose inmates were in a particularly "nervous" condition, the ants issued in excited hordes not only from the doors of the mound, but from various points on the surrounding surface. Taking a principal centre of excitement, four or five feet distant, a stone underneath which was an entrance to the galleries, I again agitated the ground. The ants as before issued from the surrounding surface, chiefly upon a line running eastward, up the slope. At the limit of excitement, which was something less than before, I once more agitated the stones and earth with like results. Thus I traced this surface gallery eastward about 60 ft., where the excitement under the above treatment ceased at an oak tree. I am satisfied that as a rule the central formicary or hill communicates with the trees which serve for feeding grounds, by galleries as long as or much longer than this.

Entrances or Doors.—The principal entrances to the formicary are at the foot of the hill. They are commonly placed around the entire circumference of the mound, and are arranged in two, three,

or more circular rows, one above another. At certain points where, apparently, there is need of especial vomitory, the gates are much multiplied. Besides these, there are openings at irregular intervals upon the entire surface of the cone. These are not numerous, but sufficiently so to allow easy approach to and exit from the more elevated portions of the mound. The main dependence appears to be upon the lower gateways. It would seem, at first thought, that there could be no real necessity for so many doors; but one who has witnessed the rapidity with which the myriads of workers swarm upon the surface when their nest is attacked will at once perceive the economy of these numerous gates. The doors are simply the surface openings of the galleries with which they correspond in size.

Huber declares it to be one of the fixed habits of the fallow ant (F. rufa), of Switzerland to close the gallery-doors at night and reopen them in the morning. The most careful attention could discover no such behaviour among the ants at Camp Riddle. At no time during the whole week was there observed any sign of attempt to close up the galleries. Even during the heavy storm of rain referred to, the doors which were closely examined at various hours of the night, remained open. It would have been more satisfactory could an observation have been made during a fall of rain in the day time, but I have little doubt on this point, and none at all on the ordinary night-condition of the doors. This is certainly a remarkable variation in habit. It may possibly be accounted for by the presence in Switzerland of some nocturnal enemy, from which the American congeners are free.

Before taking up in detail the life habits of our mound builders, a comparison and contrast may be allowed which may give a popular illustration of the immense labors of the fallow ant. I have calculated the cubic contents of one of the largest hills to be, in round numbers, two millions of cubic inches. Let us estimate the bulk of an ant equal to that of a cylinder three-eighths of an inch high and one-sixteenth of an inch in diameter at the base. We have thirty-five one hundred thousandths of a cubic inch as the bulk of a single ant, or two thousand eight hundred and sixty insects to the solid inch. The size of the builder is therefore to the size of the edifice as *one* to *fifty-eight thousand millions*. Let us compare this with a corresponding estimate of the work of man (taking his bulk at four cubic feet), as wrought upon the great pyramid, reckoned to contain two hundred and seventy-six millions of cubic feet.

Man's bulk to his building is as 1 : 69 millions.
The Ant's bulk to her building is as 1 : 5800 millions.

The figures are given roundly, without strict verification; they show vastly in favor of the mechanical energy and industry of the insect, if such comparisons may be allowed to show anything, which is perhaps doubtful. They may serve however to impress some minds more vividly than other methods, with the immense activity which marks the wonderful realm of insect life. The advantage is yet more striking when the period of time consumed in erecting an adult hill, as heretofore shown, is compared with the thirty years which one hundred thousand men spent in building the pyramid. Moreover, as will also appear, the superstructure or hill, is by no means the whole of the formicary. A vast system of subterraneous galleries penetrates the earth to unknown depths and distances, requiring labors which in magnitude may well be compared with those which excavated the catacombs of Rome.

The above statements conclude the results of my observations upon the architectural habits of the Fallow Ants of the Alleghenies. It remains to give some account of their general habits. The opportunity to study upon the field the internal economy of the formicaries is very limited. For this the use of an artificial nest seems necessary. But I was enabled, more through good fortune than skill, to note some characteristics which, I believe, have not yet been recorded. In order properly to present these some reference to well known habits will be required.

A general description of the insects will first be of interest. These forms are found in the nest: male, female, worker-major, worker-minor,

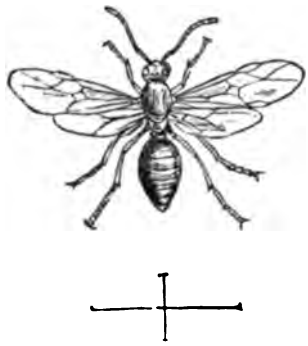


FIG. 5.—Male of *F. rufa*, magnified.

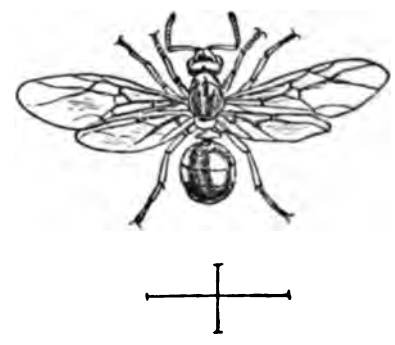


FIG. 6.—Female of *F. rufa*, magnified.

and dwarf. The length of these forms, stated approximately, is as

follows: male and female six-sixteenths of an inch, worker-major five-sixteenths, worker-minor four-sixteenths, dwarf three-sixteenths. The color of all these, except the male is the same, the head, thorax and legs varying from an orange-yellow, to a yellowish-red. The abdomen, except when distended with honey-dew, is black. The wings of the male and female are pale, smoky color. The male is wholly black, and is not so robust in form as the female, and has a smaller head. The illustrations fairly represent the general details of form in the male, Fig. 5; female, Fig. 6; and worker, Fig. 7; the lines beneath the latter figure show the natural length of the three worker forms.* A technical description of these insects will be found at the close of this paper.

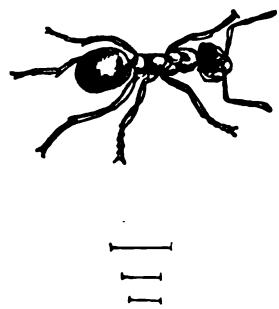


FIG. 7.—W.-major, *F. rufa.*

Food, Feeding Places, Feeding.—As the life of any one hill is substantially repeated in all the others, let us take our stand, for example, before the large mound at Pl. II. The work of construction as above described is being pressed forward upon all parts of the surface. Issuing from, and thronging into the doors that skirt the base are two columns of workers. Their fellows are hovering around the gates, hurrying backward and forward upon their several duties; but these columns keep up a steady march and countermarch, without visible diminution of numbers and (with a single exception which is recorded hereafter), without cessation day or night. One of them stretches off to the southwest, disappearing at intervals under flat stones, appearing again and crossing the top of similar stones, intersecting the lines of workers busy about the small surrounding hills, and, penetrating the jungle of grass beyond, is finally distributed among a number of young trees not far distant. The other column leads off to the southeast, up the hill a distance of eight rods, to an oak tree having a girth of twelve inches, which stands by the stone wall or fence that marks the limit of the field. This "avenue" (as we may designate the path which such a column pursues), keeps a well nigh straight course. It crosses at one point a footh-path used

* The cuts in these pages are reproduced by photo-engraving from my own rough drawings, except these three figures for which I am indebted to Dr. Edw. J. Nolan, the Secretary and Librarian of the Acad. Nat. Sciences, Phila.

by the farmers on their way over the mountain to the town. There is no marked impression upon the surface as of a worn or prepared road, but the boundaries of the avenue are constant, the ants invariably traversing the same general limits, which vary from one to three inches in width Leaving the avenue at the foot of the young oak, the column stretches its double line along the trunk and is distributed among the principal branches. A considerable portion leads off upon one of the lower limbs which overhangs the stone fence. I mount this wall, and at once have the key to the movements of the promenaders upon the avenue beneath.

Galls.—At various points along the bough and its branches vast numbers of aphides are clustered. Many of these are fastened upon the bark in the usual manner, the head depressed, the abdomen elevated. Others are clustered about small oak galls, some white, marbled with black, some of a pink-brown color with rings, some of a brownish hue. These galls contain a quantity of minute black powder, a number of very small white oval eggs (?), and a grub three-tenths of an inch long, with twelve rings, head marked with black, a black ring on the neck, and three pairs of feet. The ants seemed to be feeding upon these galls; they at least fed upon the juices of several of the grubs which were crushed with the point of a knife, while removing the galls. These, however, are but secondary objects of attention. The aphides, black insects, with brownish thorax and head, are the centres of principal interest. Here is one whose abdomen is elevated at an angle of about 45°. Upon the apex is shining a tiny globule of transparent liquid. It is greedily lapped by the attendant ant, who all the while, with alternate strokes of the antennæ, gently embraces or pats the insect. Again and again in rapid succession the sweet secretion, (the honey-dew of popular speech) gathers in drops, and is removed by the ants, several of whom have in turn enjoyed the refection. At last the aphis, one of mature size, leaves its position and moves along the limb towards the trunk. It is passed by groups and individuals of ants all of whom greet it with the antennæ as though testing its disposition or resources, and at once allow it to

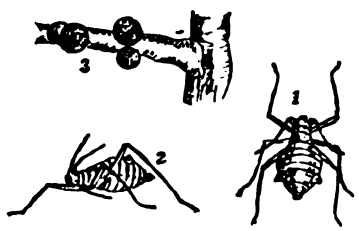


FIG. 8.—Aphis and galls. (1), aphis, back view; (2), same, side view; (3), galls. Aphis, *Lachnus Allegheniensis*.

pass on. Its abdomen appears flattened. Many of its fellows are rounded out with fullness, and must evidently be uncomfortable. The ants, however, are fast relieving them, and in the meantime, their own abdomens are undergoing a very noticeable change. They swell and elongate, until the folded bands which unite the several segments or rings are pulled out from their V shape into a straight white ribbon. The abdomens are quite translucent at last, and the burdened honey-gatherers turn toward home. Let us for convenience, call the ants in this condition, "repletes." Standing at the foot of the tree one can notice that the individuals in the ascending portion of the column have round black abdomens, while those in the descending portion are nearly all repletes.

There were two facts connected with the above observations, which for several days puzzled me. I observed that among the crowds of workers thronging the avenues radiating from the hills to various points, chiefly oak trees, the number of repletes was relatively small. It seemed out of proportion to the numbers of repletes seen descending the tree-paths from feeding grounds, with abdomens distended and translucent with honey-dew. Moreover, numbers of workers were observed returning to the hills *without* swollen abdomens. If they had not been foraging, what then? Or had they simply been more moderate in the indulgence of appetite? I was led by these reflections to follow the repletes down the tree-paths with greater care, and observed some of them disappearing at the roots. I now turned back the sod, cleared away the leaves, and observed this interesting fact: At the foot of the tree, particularly in the angle of the roots, the descending ants or repletes were stopped by workers seeking food, "pensioners" let us call them. Evidently a gallery or galleries communicating with the hill had been opened at these points, and around the openings numbers of insects were huddled together, some trying to escape down the galleries, some opposing or hindering these, and others engaged in drawing or bestowing rations of honey-dew. The process was commonly as follows: The replete reared upon her hind legs and placed her mouth to the mouth of the pensioner who assumed the same rampant position. Thus the meal passed. Of course I could not see the process of disgorgement, but could have no doubt of the fact that the builders had thus come to be fed in the same manner that queens, males and young ants are fed. I frequently saw two, sometimes three ants thus feeding at once from one replete. The repletes commonly made no objections, at least submitted quietly; but at times I noticed

what appeared anxiety to break away without parting with any of the precious treasure. The pensioners would occasionally solicit with their antennæ. Once at least the replete was seized rather vigorously. After the feeding, the repletes dashed into the galleries and disappeared through the mass of legs, heads and black abdomens of ants, all stationary and apparently engaged as above. Although the peculiar position of the fallow ants under these observations prevented me from seeing the actual process of regurgitation, yet in the case of other ants imprisoned in glass jars I have seen the passing of the honey-dew from the mouth of one insect to that of the other.

The repletes that passed down the tree without being arrested, were generally met beyond by the pensioners. Removing the flat stones around the roots, I found the insects engaged as above. The under surface of these stones seemed to be a sort of commissary stations. I covered over one cavity, made by the removal of a stone; in which I had surprised a number of ants, expecting thus to re-establish a feeding station. It happened as I had hoped. Presently lifting the stone a little, I surprised a pensioner drawing his rations, and others scrambling away as though disturbed.

The above facts were confirmed by numerous observations, at various points.

I have frequently seen the Pennsylvania Carpenter Ants, *Camponotus* (*Formica*) *Pennsylvanica*, occupied in the same manner. In one case the exchange seemed to be between occasional workers, and members of the "body guard" which constantly surrounded the fertile queen of a small colony under observation in a box. Other ants have the same habit, but the main significance of the behaviour above described is in the view which it gives of the public economy of the ant republic. It exhibits a concerted, systematic and general movement which has very much the appearance of an acknowledged division of labor. Those members of the community engaged in the work of building and protecting the formicary, really appear to leave the collecting of food to others of their fellow-citizens, not only for the helpless and dependent inmates of the nest, but also for themselves. Content with satisfying the simple wants of nature, that they may have strength to toil, they leave their work at stated periods, and visit the feeding grounds to obtain food from the super-abundance of the repletes. The stations are chosen for this purpose with admirable wisdom, for, as many of the foragers really seem to overload themselves, their progress homeward is doubtless facilitated by yielding

somewhat from their stores. and no loss is wrought to the commonwealth. Besides, it seems probable that the instinct which urges the repletes to gather store for the larvæ, nymphs and other dependents, might effectually prevent them from yielding such store to any others, after the formicary had been reached. It may be supposed, since ant nature is not unlike human nature in some respects, that the surplus honey-dew, after feeding the dependents, would be kept for individual delectation, and thus the builders and sentinels be compelled to leave their work, and forage for themselves. The general movement, therefore, to arrest the repletes at the stations near the feeding grounds is evidently for the public good.

Sentinels.—I observed on the tree-paths a movement that had the appearance of some policy of police. Workers, with the normal round black abdomen, were scattered at intervals along the trunk. They did not seem to belong to the line of ascending foragers, but rather to be stationary, as though they were sentinels or policemen. They were active in challenging with their antennæ the repletes who were on the return, and were quick to resent any interference made by intruding a finger or straw upon the path. This statement is made with reservation as I was not able fully to satisfy myself that the facts revealed a fixed habit. The point, however, is well worthy of future investigation. There is at least a probability, from analagous habits of the ant, that the individuals referred to above were indeed sentinels as their behaviour indicated. It is a well established fact, in the economy of ant hills, that sentinels are posted at or near the entrances, and common avenues of approach. I satisfied myself of this by very many observations and experiments which it is not necessary to relate in detail. It will suffice to say that on every occasion of approach of any object to a hill or entrance, workers instantly sprang upon the surface. These sentries were constantly seen lurking just inside the gallery doors, whence they issued with every mark of intense vigilance and excitement the moment a finger was intruded or the smallest object dropped near them. Frequently they patrolled the vicinity of the gates. They attacked every intruder with the utmost promptness and intrepedity. It gave subject for great wonder to note the rapidity with which an alarm was communicated throughout a large hill. Two hills in particular, whose inhabitants were for several days in a condition of high nervous excitement, attracted attention. Standing a yard or more from the base, I would agitate with my foot a stone which evidently had communication with the interior of the mound. There was scarcely

an appreciable interval of time ere the whole surface of the cone was covered with insects. The black and red masses whirled in indistinguishable mazes producing a very perceptible buzzing sound by their rapid movements. Even for several feet beyond the hill, on the opposite side, the excitement extended, and was manifest with almost equal rapidity.

Tree-paths.—The word tree-path, as used above, perhaps needs a brief explanation. It was observed that the ants ascending and descending the trees invariably kept to a beaten track, two or more inches in width. In many cases this track or tree-path was stained, the entire length of the trunk, a brownish-yellow color, caused doubtless by the formic acid which the ants secrete. The position of these tree-paths is determined by the situation of the hill to whose domain the tree belongs, for each community has its own special feeding grounds upon which intrusion is rarely if ever made. The tree-path is located habitually upon that part of the trunk which directly faces the hill. This was verified by observations upon a very great number of trees. One illustration may be given. The group of hills at Pl. III, as may be seen in the figure, was located in a considerable open space entirely surrounded by oak trees. The tree-paths were distinctly marked upon nearly all of these, showing long use, and on all of them, were columns of ascending and descending ants. Starting at any one tree, and following the circuit entirely around, it was found that the positions of the tree-paths change as one proceeds, being always inward and facing the hills. No test could be more perfect than this, the conclusion being very much to the credit of the general emmet-faculty for economizing time and labor.

An Ancient Record Confirmed.—It is worthy of note as confirming one of the most ancient records of the economy of ants, (Prov. vi. 7), that in all these movements in column, and in all building and foraging and police operations, the ants exhibited an entire independence and individuality of behaviour. Each emmet seemed to be a law unto herself, and turned freely and commonly unfailingly into the most helpful and necessary channels of duty, "having neither guide, overseer nor ruler."

Miscellaneous Food.—It will be best to introduce here further observations made upon the food consumed by these ants. No sort of attention was paid to grain and grass seeds thrown upon and near the hills. Dead beetles, hornets and other insects were found surrounded by groups of ants evidently intent upon utilizing the carcass for

commissary purposes. Ants were also found carrying the blossoms of plants and flowers. Into a little colony, settled within an artificial formicary, was introduced a large female wolf spider (*Lycosa lenta*), one of the most powerful and ferocious species. The ants attacked her with demoniacal fury, and in a moment had torn off her limbs, and were hurrying the mutilated body into the galleries. The attack showed a courage that was quite characteristic, but the method and results I was wholly unprepared for, and can only be sufficiently accounted for on the supposition of experience with such foes, and familiarity with such food. The sheriff of the county, whom I met casually, assured me that, when he was a boy, he had snared a garter snake, nearly two feet long and fastened it to one of these ant hills. The serpent was instantly attacked, and in two days the bare skeleton was found upon the hill, the flesh having been entirely removed. This was doubtless used for food, but possibly, may have been removed as a matter of cleanliness, as no offensive matter is permitted to remain upon the hills. A young gentleman, in whose statement I have confidence, informed me that he had frequently amused himself by watching these ants catch flies, which was done by a quick spring, very much after the habit of vaulting spiders. It thus appears that the fallow ants fulfill their special duty as natural scavengers, and besides the honey-dew of aphides, which is their "staff of life," are able to prey upon insects, arachnids and even reptilia. This certainly shows a range of appetite which fairly entitles them to rank as omniverous animals. I did not observe them preying upon their congeners, after the manner of some other ants. The only appearance of cannibalism was developed by dropping an ant that had been accidentally crushed upon a hill. The carcass was seized by a worker, who after apparently feeding for a while upon the juices of the crushed abdomen, bore the body away. The dead bodies of their fellows, as with all ants whose habits I have observed, are removed to some separate spot, and sometimes little heaps of carcasses are deposited together as though some rude idea of a charnel-house had entered the little creatures' heads.

Water Supply.—Water is necessary for ants as well as food. I very much wished to test the supposition that they sink their galleries through the light surface soil to the moist earth, or to the water gathered upon the underlying clay. But we were not prepared to undertake the labor required. The following pertinent observation, however, is worthy of record. One day while bending over in close examination of feeding stations at the roots of a tree, I chanced to

cough and expectorate against the trunk in the very track of the descending ants. The moisture was immediately surrounded by ants who lapped it up greedily. Following this suggestion, I procured spring-water and dampened the tree-path, placing some also at the foot of the tree in a wooden insect-box. Quite an excitement ensued. The ants eagerly took the water; some clustered over the damp bark, some surrounded the drops gathered in the crevices, some hung upon the edge and sides of the box absorbing the water from the saturated wood. One ant, whom I particularly observed, hung by the second and third pairs of legs and throwing her head far over into the box drank long. An ant coming up the tree from this trough with minute globules of moisture adhering to the maxillæ and thorax, was rudely seized and the water lapped off by one and another of her comrades. Two ants were observed imparting the water to others in the manner of repletes to pensioners. This experiment was tried at another tree, with the same results, except that the water was not taken quite so eagerly. It occurred to me that this thirst might have resulted from the long separation of the workers from the hills while foraging upon the trees. I therefore made a similar test at three separate hills. In no case was the water received with any show of thirst. Numbers of ants came up, tested, but evidently did not taste it, and turned away. This was the well nigh invariable rule, a very few exceptions being noted. These facts point, first, to the conclusion that the worker ants require water, perhaps quite constantly; and second, to the inference that the ordinary water supply is located in the vicinity of the hills.

Recognition of Fellows.—During the above investigation I was accidentally set upon the track of an interesting discovery. An ant fell into a box containing water placed at the foot of a tree. She remained in the liquid several moments and crept out. Immediately she was seized in a hostile manner, first by one, then another, then by a third. The two antennæ and one leg were thus held. A fourth ant assaulted the middle thorax and petiole. The poor little bather was thus dragged helplessly to and fro for a long time and was evidently ordained to death. Presently I took up the struggling heap. Two of the assailants kept their hold; one finally dropped, the other I could not tease loose, and so put the pair back upon the tree leaving the doomed immersionist to her hard fate.

A number of experiments were now made at the hills For example, thrusting a finger near an entrance, a sentinel instantly leaped upon and fastened herself to it. She was submerged in a cup of water,

thoroughly shaken up, and in a few moments replaced upon the mound. The moisture had scarcely dried into the sand, and the creature roused herself, ere she was attacked by a sentinel and dragged away like a culprit. This was repeated a number of times, on different insects, with the same result. Sometimes the immersed ant would be attacked by a dozen or more comrades at once. These assailants were taken with their victim, submerged and restored to the hill. So with a third series, the assailants of the assailants were themselves attacked, and invariably the same measure meted to them that they had measured to others. Like tests were made with an infusion of winter-green, and with cold coffee, with like results. In some cases the parties assailed were presently released, as though the mistake had been perceived. But for the most part there was every indication of a mortal purpose and a fatal issue. The conclusion therefore, seems warranted that the peculiar odor or condition by which the ants recognize each other, was temporarily destroyed by the bath, and the individuals thus "tainted" were held to be intruders, alien and enemy. This conclusion is certainly unfavorable to the theory that anything like an intelligent social sentiment exists among the ants. The recognition of their fellows is reduced to a mere matter of physical sensation or "smell."

The following may be set upon the opposite side. The conduct of these "tainted" ants seemed to be in curious contrast with the character of the species for pluck and ferocity. It seemed to me that they had the carriage of persons detected in some meanness, a "hang-dog" sort of air, if I may be allowed the expression. They were quite passive under the fierce assault of their fellows, and succumbed with little or no effort at resistance. Can it be that these emmets possess something like a sense of submission to the legal authority, and tacitly recognize the fact that they have become obnoxious to the communal police? One's judgment is so apt to be biased by his interest in and sympathy with these wise little creatures, that he is inclined to distrust his own observations, and fear that he may unconsciously have interpreted their behaviour after the operations of his own mind. But the facts really seemed to justify the suggestion above raised.

Amity and Confederation.—The description which Huber has given of terrible conflicts between rival communities of the fallow ant, the accounts of other writers, together with my own observations of battles between separate republics of the same species other than Formica rufa, had prepared me to expect many views of sanguinary fights among the colonists of Camp Riddle. True, I had seen nothing of the kind at previous visits; but I confidently expected some such

to occur during a week's stay upon the field. However, my anticipations were not realized; on the contrary my experiments revealed a surprising state of amity if not of confederation between the inhabitants of the several hills. The nature and results of these experiments may be gathered from the following examples. A small oak branch covered with aphides and their attendant ants was broken from a tree and placed erect upon a hill twenty rods distant. It was thought that if anything would incite to hostility it would be a meeting of members of separate communities upon the same feeding grounds. On the contrary, ants issued from the hill, mounted the branch with the usual tokens of excitement, and then mingling with the original occupants of the twig, began quietly to feed from the galls and aphides. A larger branch, having many more ants upon it, was cut, and planted upon a hill a considerable distance beyond the first. The insects were called out by tapping upon the surface. They issued with the usual whirl of excitement and anger and, as before, blended with the intruded ants without a sign of hostility. A spade full of earth was now taken from a hill, placed together with ants, cocoons and broken cells within a pail, carried to a hill some fifty rods distant and thrown upon the surface, and around the lower entrances. I could not of course distinguish between the respective members of the hills, as the masses of excited ants poured forth and began their usual movements, but I observed no sign of hostility; the imported ants melted away into the general community as if at home.

The only other test of this nature which need be mentioned was made upon three hills, say, A, B and C, which were found in such an unusually excited condition that they are down in my note book as the "hysterical hills." By the way, I visited them on the day after the shower referred to above, in order to see if they had set to work at building, like their sister cities, and if such occupation had quieted their nerves. It was as I had imagined; they were busy and greatly subdued, honest and hearty toil having quieted them very much as it does over nervous human beings. Large pieces of the cones of A and B, which are twelve feet apart, were interchanged, tossed from one to another, and although swarming with insects in the most intense state of excitement, there was no appearance of hostility. I then proceeded to C, 114 ft. distant, and called out the ants until the cone was fairly black with them. From the densest centre of life, I swiftly cut out a section about six inches square, and bore it hurriedly to B, catching the dropping ants in my hat as I ran. The contents of shovel and hat were thrown upon B, in the midst of its hosts of inhabitants. The

most complete fraternization ensued; there was the usual quick challenging with antennæ, but during the half hour that I spent intently watching every movement, there was not the slightest demonstration of hostility.

The final test was made in an artificial nest, prepared in a glass jar within which earth, sticks and surface refuse were placed. Insects taken from a number of hills situated in parts of the field most remote from each other, were introduced; cocoons from other hills were added; aphides, water and honey were given them. They united with the utmost harmony in building galleries, caring for the cocoons, and defending the nest from intruded ants of other species and spiders. From time to time ants and cocoons were added from yet different hills, but were always and at once adopted. It would thus appear that among the myriads of creatures occupying these more than 1600 hills, there is complete fraternity, if they be not indeed one mighty confederacy; a republic, which in the number of its separate states, and the multitude of its total population, far exceeds the most enthusiastic prophecy of the future of the Great Republic. If there be anything like local attachment among the inmates of the individual hills it must be very slight, or be suspended at certain periods. It would be hard to conceive of anything like local patriotism or jealousy of neighboring communities leading to war, existing among hills which were the subjects of the above experiments. And yet some other observer may record on the same ground such sanguinary battles as Huber has related. It may be that the combativeness of these ants is dependent upon some internal condition of the formicaries, and is excited only at certain seasons.

Night Work.—I may mention here another difference between the habits of our fallow ants and those of Switzerland as described by M. Huber. That naturalist records that the Swiss ants do not work at night, but shut themselves within their hills. On the contrary, the ants at Camp Riddle, when observed (as they were by me) during nearly every hour of the night from sunset to sunrise, were found to be pursuing the very same labors in the same way, and in the same fields as during the day. The avenues, tree-paths, feeding stations, feeding grounds, and hills were always thronged day and night.

Behaviour under Frost.—There was one notable exception to this. Sabbath night (Aug. 20th), was very cold. The thermometer at Hollidaysburg fell to 53° (Fahr.), a change of 30° from the temperature of the day. The next day frost was reported to have fallen at Frankstown and Newry in the vicinity. We became conscious of the

change by the uncomfortable temperature within tent. At 3.45 A. M. I visited the hills to observe the effects of the cold upon the ants. Not an ant was visible on the mounds, on the avenues or the tree-paths. Tapping the hills and stamping upon the surrounding stones, which always had brought out a multitude of insects, failed to arouse a single sentinel. I dug beneath the surface of the hill six or eight inches before coming upon ants, and these showed little activity, a sharp contrast with their usual zeal in defence of their domain. In order to be assured that the absence of the ants from avenues and tree-paths (never before noticed), was not occasioned by the torpidity or absence of the aphides, I examined one of the most largely patronized feeding grounds, the white oak beside the stone fence, already referred to as frequented by the inmates of hill Pl. II. I mounted the wall, and turned the lantern-light upon the overhanging branches. The aphides were in their places surrounded and covered by groups of ants in a semi-torpid condition. Ants in the same estate were hanging all around the intervening sections of the bough. The frost had evidently surprised them at their feast, and left them frigid upon the spot. Some of the insects had their abdomens well filled, as the honey-dew showed transparent in the lantern-light. At 8.40 A. M. a few sluggish movements were noted on the hill. On the avenues (in the shade), there were a number of ants, the great majority being homebound, and of these a large proportion repletes. At 8.50 the tree-path, then in the sunshine, was covered with ants, the majority repletes and very full. At 9.5 the ants were in their normal condition in the branches, then in full sunlight.

Winter Habits.—I was greatly desirous of knowing the condition and habits of the ants during winter. During a visit to Altoona, Oct. 26, 1876, I took occasion to drive over to Camp Riddle, some six miles distant. It was a raw, cold day, with occasional flakes of snow. The ants were confined to the mounds, only a few stragglers appearing upon the surface in a rather inactive condition. Those within the hills, however, were quite active and were able to spring upon the hand and inflict the usual wound. They all were much less affected by the cold than during the frost of the summer. The aphides were hanging upon the branches, unattended, black and with distended abdomens. Signs of work were seen on one hill; warts raised over several gallery-doors, as though a new story had been begun.

The solution of this inquiry into winter economy was referred to Mr. Kay, who on the 14th Feb., 1877, with Mr. Knox, a friend, visited the colony at Pine Hill. He had been furnished with various points

concerning which information was desired, and sent an admirable report the substance of which is given. The temperature of the day was 32° (Fahr.). Hills were first examined on the northern slope upon which lay snow five inches deep. The snow upon the mounds was of the same depth, and had not, therefore, been interfered with by the ants. A mound, about two feet in height from the vertex to the level and ten feet in circumference at the base, was opened, first on the northern and eastern sides. The frost had penetrated about four inches from the surface. At three inches small clusters of ants were found, very stupid but not torpid; the temperature here was 33°. On the south and west sides the frost had penetrated eight inches, and throughout this frozen portion, (thermometer at 33°) from a distance of three inches from the surface inward, ants were scattered, in the same condition as above. The whole top of the mound was now found to be loosened and was inverted, giving a cone whose altitude *A B* was 18 inches. The hill was found to be frozen only to the plane *C D* except on the surface as above described. The temperature of the cone at 12 inches from the vertex was 30°; the temperature of the now frustrum of a cone at six inches below the plane *C D* was 33°. There were not many ants in the cone. The greatest number was found at a distance of two feet from the vertex in temperature 33°; a few at 12 inches from the vertex in temperature 30°, sticking in the icy galleries with as much show of life as those a foot below them in a temperature 3° warmer. None of them however were very lively. The underground galleries were then examined, how far down is not stated, but no ants or other insects were found.

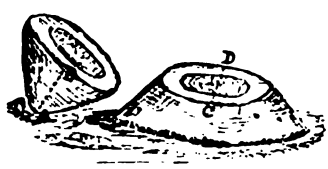


FIG. 9.—Segments of Frozen Hill.

According to instructions, mounds entirely exposed to the sun were next investigated. They lay upon the western slope from which the snow had nearly all melted away except where shaded by foliage. The hill reported below was entirely exposed to the sun, and of about the same dimensions as that just described. On the south and west sides the frost was melted out for about four inches at which point the thermometer gave 40°. Then followed two inches of frozen ground at 32°. On the east and north sides the frost was not melted out for more than an inch; the frozen portion extended inward four inches at 33°. The top of the cone was then turned over as before, and found

to be frozen to a horizontal plane 12 inches from the vertex, the melted portions named above excepted. The temperature at 18 inches from the vertex was 34°. In the frozen parts no ants or other insects were found; but on the rim of the unfrozen portion a colony of white ants (*Termes flavipes*), was found occupying a series of cells in a space about four inches square, and in a quite lively condition. Near them was a large collection of roaches, a hundred or more apparently of the most lively character. There were scarcely any ants near these; but in the centre of the piece they were very plentiful and lively. No beetles were found, and no aphides were discovered about the roots of the grass, although diligent search was made.

There are several inferences, more or less conclusive, concerning the winter economy of the fallow ant which we may draw from the above facts. First, the ants dwell within their formicaries during winter and make no attempt to modify the surface surroundings. Second, the vast majority of the community, together with the fertile queens, larvæ and cocoons occupy the underground galleries. This appears from the fact that but one young queen, and comparatively few workers of the various classes, were found in the hill galleries. Third, the composition of the mounds is such as to ensure, in the central parts, a good degree of protection against ordinarily severe winters for the few ants that occupy them. Fourth, the vitality of the ants is sufficient to keep them active within the hills during all ordinary seasons. Fifth, it is yet more evident that the occupants of the underground galleries are not torpid during ordinary winters, if ever, but exist in a state of considerable activity. Finally, it would appear that the ants are able to spend the winter in the active state without regular and ordinary supplies of food.

I do not advance this last opinion with any great degree of confidence. The mystery of the underground galleries still vails the facts that would solve the question completely. But all the known facts point to the above inference. I had thought that the tufts of grass which grow upon many hills, and which evidently grow at the ants, consent might be preserved not only to strengthen the architecture, but to furnish at their roots sustenance for aphides. Accordingly, at a visit made Oct. 26, 1876, a cold, snowy day, I carefully searched for aphides upon the roots of the grass, but found none. Mr. Kay's search was equally fruitless. The roaches found in such numbers by Mr. Kay, and also by myself, are doubtless simply squatters upon the emmet territory. However, it must be considered as still unsettled whether

our mountain mound-builders feed during winter, and if so, what are the sources of their food supply.

Beetles.—The possibility that the beetles, certain species of which are well known to frequent the nests of ants, might be in some way concerned in this interesting query, did not escape my attention. But I was never so fortunate as to take any beetles in the hills either during the summer or fall visit. This was doubtless chiefly owing to my ignorance at that time of the size and appearance of the insects, and the best mode of capturing them. I hope at another visit to remedy this deficiency. Dr. Horn informs me that the Spring is the best season to search for these domesticated beetles. Among the ants collected in midwinter by Mr. Kay, and sent to me as specimens, I found one beetle. It is a small insect, about one-tenth of an inch in length, of a dark claret-brown color, quite closely resembling in this respect the ants among whom it dwells. It is determined by Dr. Horn as *Tmesiphorus costatis* Leconte, and belongs to the Clavigeridæ. The discovery of this beetle in midwinter, together with the fact that the beetles are found in abundance with the ants in early spring, show these insects to be closely connected with the winter life of the ants, if not with their winter food supply.

Dr. John L. Leconte, so widely distinguished for his thorough knowledge of the Coleoptera, has shown me the following species collected by himself from ants' nests. Two of these, taken from formicaries of our Allegheney mountain mound-builders, I have been permitted to figure. They are drawn in order simply to give a general idea of their appearance, and not for systematic description. The most interesting of these is perhaps Fig. 10, 1, *Atemeles cava*, Leconte, which, like the Clavigeridæ, is furnished with tufts of hollow, hair-like tubes, on the sides of the abdomen. From these tufts a sweet secretion exudes, upon which the ants feed, as upon the honey-dew of the aphides. *A. cava* is a brown-colored insect, about one-fifth of an inch in length. Specimens were found with fallow ants in Columbia Co., Pa.; in Michigan, Maryland and Illinois. Those from Ill. were found in nests of F. rufa (?) in large numbers. One of the ants taken with the beetles, still holds in its mandibles, firmly clasped even in death, one of these household treasures. The other specimens figured are desti-

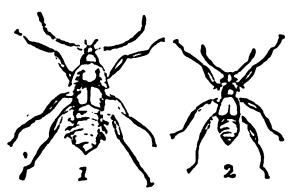


FIG. 10.—Beetles found in nests of F. rufa. No. 1, *Atemeles cava*, Leconte. No. 2, *Cedius Ziegleri*, Leconte.

tute of the hair-like tufts, and probably serve simply as scavengers, or, are permitted to remain as "squatters" in the formicary, for some purpose the economy of which is unknown. *Cedius Zieyleri*, Leconte, Fig. 10, 2, was taken in a hill of F. rufa at Bedford, Pa. It has short elytra, the color is brown, the length is one-tenth of an inch. On each of the first pair of legs are two spines, one located (apparently) at the base of the femur, the other on the trochanter. The remaining specimens were also taken at Bedford, Pa., and are an undescribed species of Homalota, and an unnamed species of Oxypoda. They are small brownish insects, with a slight pubescence.

Larvæ, Cocci and Aphides with Ants.—That the cocci may contribute quite largely, and the larvæ of some beetles more or less, to the limited supply of food required by the ants in the cold season, is probable. I have taken larvæ in the mounds, and two were sent by Mr. Kay from a frozen mound opened by him. I have never taken them in positions that justified the belief that they were attended by the ants, they having been brought out in the broken earth of the hills. Mr. Kay's specimens were probably taken in the same way. Prof. Leidy (Proc. Acad. Nat. Sci. 1877, p. 145), found, in the early spring, that a small colony of yellow ants (probably *Lasius flavus*), had three different insects in their possession, consisting of a species of aphis, a coccus, and the larva of an insect which Dr. Horn informs me is of some species of Coleoptera. The aphides were kept in two separate herds, and these were separated from a herd of cocci. The larva was in the midst of one of the former herds. In a larger colony of the same ants, there was a herd of aphides which occupied the under part of one margin of the stone under which the formicary opened, and was almost ten inches long by three-fourths of an inch in breadth.

The number of "domestic cattle" included within such a space was obviously very large. This same colony was also possessed of a herd of cocci who were closely crowded together and occupied about a square inch of space. These were kept quite separate from the aphides. In both the above colonies the aphis and coccus were the same. The aphis was of a pale yellow color with white tubercles on the dorsal surface of the abdominal segments. The coccus was of a dark-red hue. Both aphides and cocci with few exceptions adhered to the under surface of the stones, and were not attached to roots. They appeared to be carefully attended by the ants who surrounded them. I have frequently observed white aphides, apparently the same as the above, in similar

positions in early spring, attended by these yellow ants. They always seemed to be in good condition, (as Dr. Leidy says were also the aphides observed by him), were plump and active, as though having weathered the winter in robust health. It is not improbable, considering the habits of our F. rufa, that aphides are domesticated within their nests, and could be found in the early spring. The fact that aphides are thus found in nests of *Lasius flavus*, indicates that for at least the latter part of the winter they contribute to the food supply of the ants. The same conclusion would be drawn from a similar fact in the economy of F. rufa. It is to be hoped that this point will receive attention from some observer who can have access to the hills in the early months of the year.

The coleopterous larva alluded to by Dr. Leidy was almost six millimeters (about one-fourth of an inch), long, and was covered on the back with a thick white cotton-like secretion. It was also carefully attended by the ants, which were frequently observed to stroke it with their antennæ. It is a point to be investigated, whether like larvæ similarly attended, may not be found in spring-time within the nests of rufa.

Lepidoptera larvæ with Ants.—I introduce here as bearing upon the general matter of ant food, and the relation of ants to myrmecophilous insects, the following observation. During the early summer of 1877, I had frequent opportunity to note the habits of a large colony of black, shining ants, *Formica subsericea*, Say, whose formicary is established at the edge of a grove on the farm of Mr. George B. Lownes, Delaware Co., Pa., nine miles from Philadelphia. The ants were found scattered through the woods, within a circuit of many rods from the nest. June 18th, I observed a column of these ants ascending a young wild-cherry tree, near which grew several tall stalks of the black snake-root or bug-bane, *Cimicifuga racemosa*. While watching the ascending column I noticed an ant moving upon the round blossoms of this plant. Attracted by some peculiarity in its movements I fixed my attention upon it, and saw it to be in attendance upon a small green grub about one-half inch long, which proved to be the larva of a butterfly probably some species of Lycænidæ. The lower segments of the abdomen were continually gently stroked by the antennæ, in the familiar manner of ants when soliciting honey-dew from aphides. This novel behaviour was of such interest that I placed the ant under close continuous observation for more than two hours. During this time the strokes were repeatedly interrupted by short ex-

cursions up or down the plant, the ant always returning and renewing the solicitation. The ant always occupied a position below the grub, and directed her strokes toward the head, which, however, generally fell upon the lower part of the body. The larva did not remain stationary, but several times moved its position, slowly creeping around the stem. I ceased observation at noon, and returned to the grove at 4 P. M. The grub was in about the same position, and was attended by the same (or another) ant who was accompanied by a companion. The same behaviour observed in the morning was continued until 5 P. M., when I captured ants and grub and took them home. A number of the same larvæ in different stages of growth were found on the same plant in various parts of the grove. I was only able to observe that the ant continued to attend the grub under confinement just as in the woods. But preparations for a journey to Texas, compelled me to suspend observations. Although satisfied that the object of the ants was to secure some kind of refreshment from the larvæ, I was not able to note any secretion on the grub, or anything like the actual taking of food by the ant, although the mouth organs were applied to the last segments.

A casual mention of my discovery was the means of opening communication with W. H. Edwards, well known for his valuable works upon the Lepidoptera, who later in the summer (as I infer), had observed the same fact. In comparing notes it was found that the larva observed by him in West Virginia, was also of the Lycænidæ (*Lycæna Pseudargiolus*), and that it was domiciled upon the same plant, (*Cimicifuga racemosa*). Two species of ants were seen attending the larvæ. Mr. Edwards has kindly communicated to me the details of his own observations; but as he purposes to give them to the public at an early date, I will not anticipate any further than to say that under the microscope the larvæ prove to be possessed of organs upon the upper part of the last segments, apparently designed or fitted for the exudation of some fluid. Mr. Edwards also directed my attention to a paper by M. Guenèe, in the "Annales de la Société Entomologique de France," Ser. iv, tome 7, 1867, pp. 665—668, which I have consulted. The paper is brief but exceedingly interesting, and gives a full description, illustrated by figures, of organs found upon the eleventh segment of the larva of the butterfly (*Lycæna bætica*), whose protrusion from two openings near the ninth and last pair of stigmata, was observed, and the action and organ figured and described. At the summit of the tenth segment the author found another single opening, placed trans-

versely, and surrounded by a projecting border around which the granulations which cover the whole body of the larva are especially massed. Out of this sort of button-hole, and at the middle, rises, at the will of the grub, a species of hemispherical, transparent vesicle, which gives passage to a serous liquid sufficiently abundant to form a large drop, which is reproduced whenever it is removed. The larva does not secrete this liquid except when disturbed imitating in this the *Cucullia* and many other larvæ which disgorge at the mouth a colored liquid, with the intention, doubtless, of repelling those who molest them. M. Guenée ventures no opinion as to the economy of this exceptional structure. But, his description throws great light upon the behaviour of the ants as recorded above. There can be little doubt that the gathering of a serous liquid, like that observed by M. Guenée, upon *Lycæna batica*, was the object of the attendance of the ants of *Formica subsericea* upon the Lycænid larva as observed by myself. This larva (in alcohol), was placed in Dr. Leidy's hands for examination, under the microscope. He found on each side of the two (or three) last segments, on the dorsal surface, a prominent, circular, brown-colored glandular looking body, with a central depression. These glands were quite distinct from the spiracles, which are not represented in the accompanying cut. Fig. 11 shows the appearance of these glands as situated upon one side of the terminal segments. It is possible that the last three segments are here represented, the last (twelfth) being contracted. Dr. Leidy found no opening at the summit of the tenth or other segment, corresponding with the button-hole like secretory gland described by M. Guenée. The above facts are all of very great interest, and may prove to be another important factor in solving questions concerning the food supply of ants under both ordinary and extraordinary circumstances.

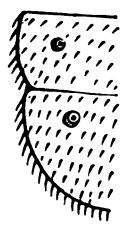


FIG. 11. Glands upon terminal segments of Lycænid larva, attended by *Formica subsericea*.

Natural Enemies.—When we consider the vast numbers of insects within a single community of the fallow ant, and their apparent immunity from the destructive effects of climate, we are not only deeply interested but much perplexed under the inquiry, what are the agents and influences that limit their increase? If the amicable relations existing under my own observations are permanent, their numbers are not held in check by civil wars. There appears to be an established feud between them and the large black Carpenter Ant, *Camponotus*

(*Formica*) *Pennsylvanicus*, but the losses inflicted during the occasional conflicts with these creatures must be quite small. Spiders of the various sub-orders destroy some. At the foot of one hill between two stalks of grass a female of *Argiope fasciata*, one of the most beautiful of our indiginous orb-weavers, had spread her snare. An ant which was fed to her was seized, rapidly swathed in the usual fine white web, and fed upon. The numerous sedentary spiders that spread their webs upon trees and bushes must ensnare a goodly number. A variety of Formica rufa which for several years has inhabited the great cliff at Rockland in Fairmount Park, finds a most formidable foe in that ferocious line-weaver *Theridium tepidariorum* (*vulgare*, Hentz), who spreads her great, strong snare in the recesses of the rock. I have seen scores of ants clinging to these webs and have gathered up half-handfulls of the dry carcasses underneath. The various genera of the wandering spiders are no doubt formidable to single ants. On the trees the abuscading Laterigrades and those swift-vaulting garroters, the Saltigrades, must cut off many a straggling forager. On the ground, perils threaten the Formicidæ from the powerful and ferocious wolf-spiders (*Lycosidæ*), and the familiar spotted tube-weaver (*Agalena nævia*), whose broad-sheeted, funneled snare is so widely spread among the weeds and grasses. But we may well exclaim, what are these among so many?

The birds may pick up a few. A gentleman who visited our camp one day informed me that as he rode along he observed a large flock of blackbirds in the woods, on the ground among the hills, a dozen or more being on a hill apparently pecking at the ants. These birds harbored in the woods several days, and although our party all watched them closely nothing of the kind was again observed. Mr. Prough, the farmer whose land and residence adjoin the wood, declares that although crows freely eat the black Pennsylvania Carpenter Ant, no sort of birds or fowl will touch these "pismires," as the fallow ants are popularly called upon the mountain. Perhaps after all the chief causes operating to limit the spread of this species are geological. But until we know more certainly the geological conditions favorable and adverse to their increase, the question must remain open.

The species is found in abundance in the sandy barrens of New Jersey. I have in my possession an artificial formicary of living specimens sent me by Mrs. Mary Treat of Vineland, who during the past summer has made many interesting observations upon ants, particularly the kidnapping *Formica sanguinea*. The New Jersey rufas

quite closely resemble those of the Allegheney mountains. I have also specimens taken during last summer by Prof. Joseph Leidy, M. D., in the Rocky mountains, near Fort Bridger, Wyoming Territory. These insects, though closely resembling the Allegheney mountain forms, are somewhat longer, and more nearly approach the ants found in Fairmount Park, Philadelphia. The latter do not raise mounds; the Rocky mountain insects are mound-makers. In all the above cases a light, sandy soil is the natural habitat of the ants.

Means of Attack and Defense.—The worker and female ants are provided each with a pair of curved mandibles (Fig. 12; 8, inside or palm; 10, outside; 9, male mandible); irregularly toothed on the inner edge, which are attached to the lower part of the head and have a horizontal articulation. The teeth are seven, the outermost one being much the longest; there are (counting inward), two large teeth, one small, one large; two small and one flat tooth on the inner edge. These organs are the implements of labor and the weapons of warfare. They are plied with terrible earnestness and vast force. The method of inflicting a wound, as observed upon my own hand, is as follows: the mandibles clasp the finger, and while the feet hold firmly to the skin, are drawn together over it, with a scraping motion. At the same time the abdomen is doubled under the body acting as a sort of lever which being pressed downward against the skin, greatly increases the power of the mandibles to tear and pull the object seized. But this is not the chief purpose of this movement; for from the lower part of the abdomen a jet of formic acid is thrown forward upon the surface on which the mandibles are working. As the teeth or "cogs" penetrate the cuticle this acid produces a sharp, stinging pain, suggesting a puncture by a red-hot needle. I could not see the jet of acid, as I have seen it when issuing from the Carpenter Ant, but the taste and odor as well as pain, showed its presence.

FIG. 12.—8, mandible of worker, inside view; 10, same, outside; 9, mandible of male.

The wound thus made, which is neither a bite nor a sting, but something like a combination of the two, is quite serious to inferior animals, and is very annoying to horses and cattle. It is sufficiently formidable to human beings to make them cautious in all their approaches to the hills. When the creatures fasten upon the neck or get under the clothing and unexpectedly bestow their "bite," the

effect is at times rather comical to all save the victim. However, I was able to protect myself sufficiently by the use of gloves, and some precautions against the entrance of the irrate creatures under the clothing. I was frequently covered with ants and often wounded, but was rarely compelled to abandon my observations. I was satisfied, therefore, that the effect of the fallow ant's "bite" has been exaggerated.

To test it fairly, I uncovered a foot and thrust it against a hill. It was soon black with ants and recalled to my mind Swift's description of the little people of Lilliput swarming upon the Man-mountain. I was quite able to endure the pain, but unfortunately for my experiment, two musquitoes lit upon and bit the foot just as the ants began to make themselves felt. There was a smarting sensation in the foot for about thirty-six hours, which I credited mainly to the musquito bites, to which my flesh is very sensitive. Several small, scarlet spots somewhat resembling a rash were the only effects of the ant poison, beyond the immediate pain. Such was my experience; the consequences, however, to other persons might have been much more serious.

Sexes, Cocoons and Larvæ.—Among the most interesting points of economy, and which I was most anxious to observe, are the relation of the sexes and the development and care of the young. But it was my misfortune to observe nothing of any importance. Neither male nor female ants were found during the whole week. The males had evidently disappeared for the season, as the pairing of the sexes occurs about the close of June. I am inclined to think that the fertile queens must occupy the galleries beneath the surface, as the most careful search in many hills failed to discover one. A young queen, however, with the stubs of wings still adhering to the body, was taken by Mr. Kay in the centre of a mound in the middle of February. About the middle of July I have taken the winged queens upon the surface of the hills, where they were being led about under the convoy of a worker. Other queens were seen conducted into the galleries. I infer that these were recently fertilized queens whom the workers had captured and were conveying home, but I made no examination to confirm the inference.

Numbers of cocoons were found, and a few small larvæ. The former are straw-colored, cylindrical, about a quarter of an inch long, a small black knot of hard, dry matter, apparently excrementitious, at the apex of the abdomen. The cocoons were found massed in cells of

various sizes, and at various distances, varying from two inches from the surface to eighteen. The cocoons under care in an artificial nest were invariably kept in the dark; as soon as the cells containing them were exposed to light they were removed. The number of shells which the workers were carrying out of the hills indicated that many of the nymphs were being released from the cocoons. For some observation made by me upon the manner in which this is done by the Carpenter Ant, I refer to a paper in Transactions of the American Entomological Society, Dec., 1876, p. 288. These antlings are at first of a pale color, and while yet callow, within a few days of their release from the shell, engage in the care of the cocoons. Such at least was the case with those confined in an artificial nest. The antlings remained in the nursery close by the cocoons, for which they showed the strong maternal anxiety of a mature worker. It is probable, as Sir John Lubbock has suggested, that they do not enter upon more exposed duties until after the thorough induration of the skin.

The following is a description of the ant whose habits are detailed in this paper:

Formica rufa.

Female.—Head, thorax, legs and scale of the petiole of abdomen ferruginous; mandibles and posterior margin of vertex dusky; flagellum of antennæ dusky, the scape ferruginous; wings with one marginal, two submarginal and one discoidal cells, pale fusco-hyaline, stigma brown; abdomen shining, blackish, varied with ferruginous at base, the apex and venter sometimes tinged with brownish and clothed with pale hairs, petiole and scale ferruginous, the latter vertical, compressed, rounded on the sides above and slightly notched on the middle. Length .35 inch.

Worker.—Ferruginous; mandibles, flagellum and legs except coxæ, trochanters and extreme base of tibiæ, fuscous; abdomen except petiole blackish, shining; scale of petiole subrotund, subsinuate above. Length .25 inch.

Male.—Blackish-fuscous, clothed with a very fine sericeous pile, more conspicuous on abdomen; antennæ brown, scape tinged with ferruginous; wings as in ♀; legs pale ferruginous, posterior coxæ dusky. Length .35 inch.

Allegheny Mts., Pennsylvania.

I add from the admirable work of Dr. Auguste Forel, "Les Fourmis de la Suisse," the following translation of his descriptions of the sub-family, genus and European species to which our F. rufa belongs. My observations were all made and the results recorded more than a year before I had access to M. Forel's work. My paper is therefore in every respect wholly independent of his. I mention this fact because it gives added value to those facts observed by myself, which will be found also in the "Swiss Ants." The same co-incidence will be observed in the results recorded in my paper on *Camponotus* (*Formica*) *Pennsylvanicus*.

Family, **FORMICARIÆ.**

Sub-family. Formicinæ. First Division. *Workers.*—The abdomen seen from above, shows five segments, of which the fifth is conical and terminal; the anus is small, circular, apical, and ciliated at its edge. Spurs simple; poison vessel cushioned; nymphs nearly always enclosed in cocoons. The bowl of the gizzard spherical, or a little wanting of spherical. The chaperon is not prolonged between the frontal ridges (*arêtes frontales*), beyond their origin.

Females.—Exactly corresponding with workers. Wings with one cubital cell.

Genus, **Formica,** Linn. *Workers.*—Mandibles broad, toothed at the outer border, as with other genera. Metanotum bossed, (*bossu*), but not more elevated than the rest of the thorax. Labial palpi with four joints. The anterior part of the chaperon is advanced at the middle and pulls out the origin of the labrum (*labre*), like the eaves of a roof, (*en avant toit*).

Frontal area triangular, very distinct; ocelli likewise very distinct, as is also the frontal furrow. The maxillary palpi with six, sometimes with five joints. The joints of the flagellum of the antennæ continue to diminish in length and thickness from the first to the tenth; the eleventh (twelfth of the antennæ), is on the other hand a little longer. Scale vertical, calix of the gizzard (*gésier*), a little greater than the bowl.

Females.—Frontal area triangular, very distinct; characters (thorax excepted), identical with those of the worker.

Males.—External genital organs large. Exterior genital valvules cultriform. Frontal area, palpi, gizzard as with ☿. Median lobule of the last joint of the posterior tarsi having scarcely half the length of the hooks, (crochets). Scale vertical, thick. Body robust; size often equal to that of the ♀.

Species, **F. rufa.** *Workers.*—Chaperon entire at its anterior edge, size very variable, body thick-set, (*ramassé*). Head and abdomen much wider than the thorax. The notch between the mesonotum and the metanotum large. Metanotum greatly arched. Of a fallow red color quite lively, (varying in brightness), more or less mixed with brown and black, but the boundaries of the colors always quite plain, except with the very small individuals, (dwarfs). Eyes and ocelli large. Chaperon with a keel indistinct or distinct only on its anterior half. *The frontal area always smooth and shining.* This ant has the habit of ejecting its venom. Nests made of gathered materials. Nymphs almost always in cocoons.

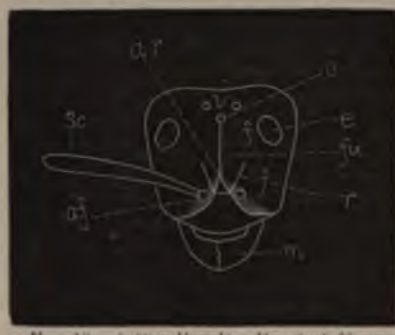


Fig. 13.—(after Forel). Head of *F. pratensis*. *m*, mandibles. *c*, chaperon. *j*, left jaw. *f*, front. *v*, vertex. *o*, ocelli. *e*, left eye. *fu*, frontal furrow. *r*, left frontal ridge. *af*, right antennal fosse. *Sc*, scape of right antennæ. *ar*, frontal area.

Females.—Abdomen short, almost spherical, body thick-set, squat (*trapu*), very robust; thorax elevated; head much larger than the thorax. *Frontal area always smooth and very shining.* Color of worker. L. 9—11 mm.

Males.—Body robust, broad, very hairy, black. External genital organs and frequently the legs of a yellowish-red. L. 9—11 mm.

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